

IS THE INTRODUCTION OF 'LIVINGS WALLS' IN SWANSEA CITY COUNTERPRODUCTIVE?

ABSTRACT

A report on the introduction of 'Living Walls' to a coastal city. Its effects on the architecture, residents, and the productivity of this construction method.

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Word Based Project ACBA 5009

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Chapter 1

Introduction

This report aims to delve into the connection between the construction industry and well-being of the population by focusing on the MMC of living walls. Living walls have been introduced to various buildings across the UK over the last couple years due to links to increased well-being and productivity. By reviewing literature based on these theories and comparing the results to a questionnaire carried out by locals, the reports' objective is to confirm whether the introduction of living walls is counterproductive when implemented in a coastal town. By using the results from the questionnaire, it will either support or oppose the statement from residents' perspective. The final report will conclude on how accurate the statement is from both published and personal points of view.

Chapter 2

Literature Review

The idea of living walls stemmed from the invention of 'botanical bricks' by Stanley Hart White, whilst studying at the University of Illinois. Built in his own garden, Stanley White developed the first prototype of a living green wall and was granted a patent on Vegetation-Bearing Architectonic Structure and System in 1938 (Pritchard & Pritchard, 2022). The construction community widely acknowledged his work and vision to create greener infrastructures. By reading White's diaries and personal journal entries it is evident that his idea of a botanical brick began as early as 1931, with heavily detailed drawings and in-depth research included. Stanley White was an innovative and exceptionally creative person who was regarded as a pioneer of his time. Botanical bricks were initially designed as a solution to enhance the bland architecture of his surroundings, the aim of the green wall was to create a modern, unique, and elevated topography, consisting of a soil filled wall, composed of decorative inserts and topical coverings. The idea was to modify a non-structurally bearing wall to create a more decorative background for existing structures. White's astonishing work has been recognised as 'new art' and was labelled a great step forward in modernism (Hindle, 2012).

The concept of a green wall was first officially put into practice decades later by a French botanist called Patrick Blanc. Blanc took out a patent of his own 'Mur Vegetal' and is

now arguably seen as one of the original pioneers of vertical green walls. Following its remarkable success in Paris, living walls have become increasingly desirable, being introduced, and popularized in many countries across the world as a new form of modernism alongside upscaling traditionally boring and plain landscapes (Respira, 2020). Blanc's first green wall now sits in the Museum of Science and Industry in Paris where its full hydroponic system and inserts can be admired. Long before the innovative work of both Stanley Hart White and Patrick Blanc, the idea of merging city life with outdoor greenery was a concept greatly sought after. The concept of a green façade had been appreciated for several decades with subtle notions such as vegetated rocks and the use of climbing plants over brick walls used frequently across history. Scientists have more recently confirmed that the use of greener more natural habitats within construction can lead to serious health benefits.

Not only does introducing greener landscapes to more traditional buildings create a more attractive view, but it also paves the way for a proven healthier lifestyle. An article published by (Gaskell, 2017) printed in Forbes in 2015, examines the results of a study conducted by Harvard earlier that year. Based on the U.S. alone the study surveyed top performing buildings to compare both productivity and overall well-being of the users. The study found a 30% decrease in time taken off by occupants due to sickness in addition to a 26% rise in cognition. This information can be seen throughout studies and experiments from years prior, with the University of Exeter conducting a similar study the previous year. They found an increase of productivity by 15% based solely on having 'greener' offices (University of Exeter, 2014). Since the early 2010's various reports, experiments and studies have been conducted on the beneficial side effects of having greener work or living spaces to occupants' well-being, as seen in *The Relative Benefits of Green Versus Lean Office Space: Three Field Experiments* by (Nieuwenhuis, et al., 2014).

With such positive results from these studies and clear benefits of utilising greener workspaces, it is no surprise that living walls have found themselves largely introduced across much of the UK on buildings heavily associated with stressful environments such as universities, government buildings and in heavily populated areas. Living walls can be found scattered across the UK in the form of decorative vertical gardens or part of structural walls as seen in several locations across London alone (Gray, 2019). When considering London's landscape and the dominant Georgian architecture throughout the capital city it is easy to understand how the introduction of living walls or vertical gardens can have huge effects on the occupant's wellbeing and overall aesthetic of the area. The contrasting appearance between concrete and greenery references back to the initial need and want to merge the tranquillity of

a green façade to a sometimes-overpowering built environment. However, dissimilarly in smaller more coastal locations it is a rare occasion to feel overwhelmed by tall, dark, and gloomy skyscrapers. Swansea sits approximately 200 miles horizontally west of London on the south coast of Wales (Google, 2022). Less associated with fast-paced urban living, Swansea is a nearshore settlement with many areas being heavily populated with retirees. This lifestyle is a great contrast to the much faster paced environment found in London. The city centre is free of many problems related to overpopulation associated with heavily built-up areas. With Swansea's city centre based less than 2 miles away from the beach, it begs the question whether Swansea necessarily needs the same green façade that is offered by using living walls? If the area does not need additional natural sites and views then is there other factors involved in the thought process behind building living walls in coastal towns?

During the 2020 pandemic, the relationship between people and plants grew far more than in previous years. With 1 in 4 people being furloughed between March 2020 and June 2021, it saw the beginning of a new lease of life between many people and their homes (Churchill, 2021). A report carried out by (GOV.uk, 2020), stated that time spent carrying out DIY and gardening had increased by 147%. With a majority of the population having more time on their hands, many of us turned our focus to the homes that we were restricted to. Gardening in fact saw a huge rise and was voted the sixth most popular activity to do during lockdown, with nature walks voted the top activity in the UK (Hughes, 2021). People reported feeling happier and even credited the boost in their mental health and well-being to their newfound hobby (Lee, 2021). From previous research it is apparent that surrounding yourself with greenery offers great benefits and during the pandemic the population supported this theory.

Chapter 3

Questionnaire

A questionnaire has been designed to facilitate residents in sharing their opinions and knowledge on the subject. The results will be directly compared to the literature, helping to compile an arguments both for and against the topic.

Research Methodology

Additional research will be conducted alongside the literature review. A questionnaire can provide further information and insight into the topic and possibly highlight secondary

opinions to the subject matter. A short but efficient survey or questionnaire can lead to a higher response rate and provide clearer results for analysis. Providing the participants with specific information regarding the topic will also allow for more honest and accurate replies. It has been suggested by (McLoed, 2018) that regardless of responses being anonymous, some participants can provide false answers at the possibility of them not wanting to differ or stand out if they do not understand the question or statement. The questions will be multiple choice answers, additional information will be optional on certain questions if a participant wishes to further their response. The aim is to achieve 100 responses, this will result in a good-sized population that can be analysed properly leading to a more accurate representation of the wider population of Swansea. The survey will be posted to residents, some with construction backgrounds and others without. As the topic is specific to coastal towns it is important to ensure all participants can relate to this topic in some form, ensuring there no skipped questions or inaccurate replies. According to (Qualtrics, 2022), the key factors to a successful survey are to include the purpose of your survey at the beginning, speak the least-informed responders' language, use simple questions and lastly to 'funnel' the survey. As the chosen topic is specific to construction and a subject not fully acknowledged by the masses it is vital to ensure that the survey is not difficult or deterring to any responders. A possible format of a survey follows.

- Survey title, with possible sub-title
- Survey description
- Questions 1 – addressing the topic directly, collating audience knowledge on the topic
- Question2 – confirm the audiences' understanding of the topic
- Statement – provide a description of the topic
- Question 4 – confirm the audience's opinion on the topic
- Questions 5 – confirm audience's personal relationship to the topic
- Question 6 – further acknowledge audience's understanding of the topic
- Question 7 – funnel the survey for responders' direct opinion on the topic in their area
- Question 8 – assess audience's stance on the topic
- Statement – provide build/cost/outcome information
- Question 9 – address the information and confirm if this changes any responder's stance

The purpose of the survey is to analyse residents' opinions, thoughts and understanding of the research topic. Once the survey is completed by the targeted 100 responders, the results will be processed into understandable data for the proposed research topic. The results will serve as a baseline for the populations opinions on the chosen topic and will be built on and referenced throughout the proposal.

In the case of lesser results, or lack of responses the research will also look to include short interviews. Interviews can take considerably longer to arrange, conduct, and analyse therefore a survey will be first protocol with interviews supporting data if and where possible. As the final report looks to discuss opinions from local industry professionals and residents on the subject, it is important to gather information from external sources beyond just literature.

Results

The survey was successfully completed by a total of 69 applicants over the duration of a couple of days. The full survey was sent out via a link on various social networking platforms. The questionnaire targeted local people, people working in construction, and those living or having lived in a coastal town. Each question has been analysed and presented below.

Questions 1.

Do you recognise or understand the term 'green wall' or 'living wall'?

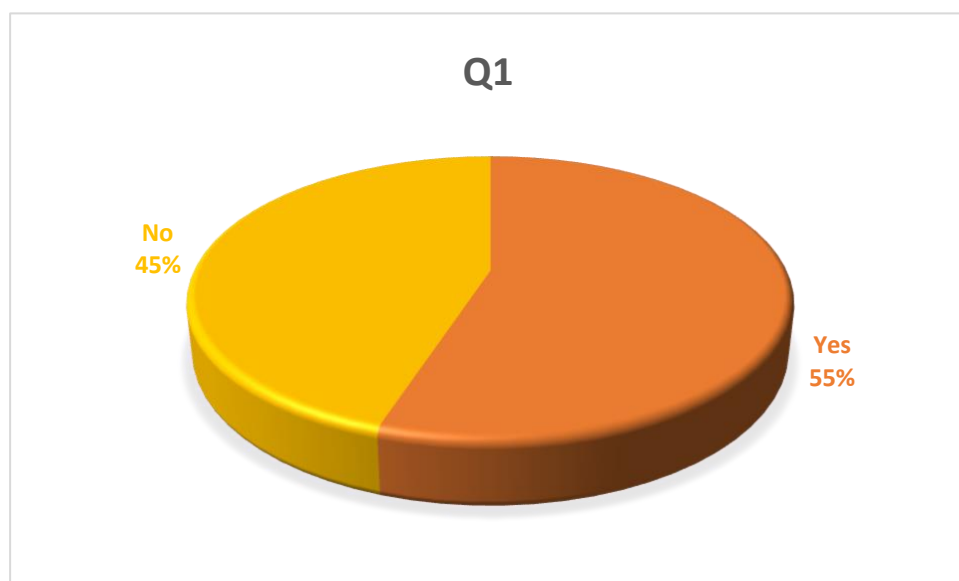


Figure 1 - Pie chart showing results for question 1

As shown in **Figure 1** above, when considering a mixed group of participants the split is nearly 50/50, with 55% saying they were familiar and 45% saying they were unfamiliar with the concept of a green wall. This question was purposely written to confirm whether the term and/or construction method was well understood in a town where a living wall had already been implemented. By understanding my audience's base knowledge, it is advantageous to the overall research. The topic includes residential input; understanding their grasp of specific terminology will further assist in successfully portraying their views.

Question 2.

How familiar are you with the term 'green walls' or 'living walls'?

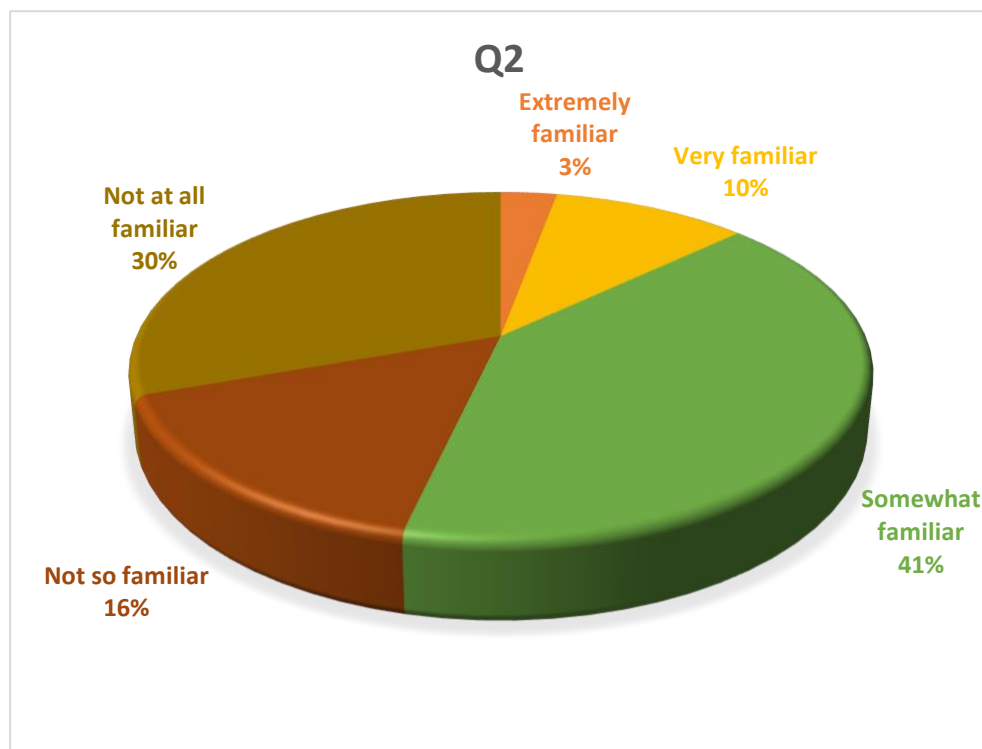


Figure 2 – Pie chart showing results for question 2

Understanding how much the audience knows initially about the topic will provide important information that shows how opinions can change when provided with facts or statistics related to the topic. People are likely to be unfamiliar with the topic until it is fully explained, then realise that they actually had some base knowledge to begin with. Also If the majority of the sample population had chosen 'somewhat familiar' to 'extremely familiar' then there could be a large sway in the results of later questions. The more knowledgeable the audience is on the topic, the more likely they are to already hold a strong opinion. If a

considerable number of participants already held a particular opinion, then results of certain questions may be skewed.

Question 3.

Prior to question 3, the audience was given the below description.

"A green wall is a vertical built structure intentionally covered by vegetation. Green walls include a vertically applied growth medium such as soil, substitute substrate, or hydroculture felt; as well as an integrated hydration and fertigation delivery system." (Wikipedia, 2022)

Given a brief description of 'green/living walls' do you feel this is something that would benefit your community?

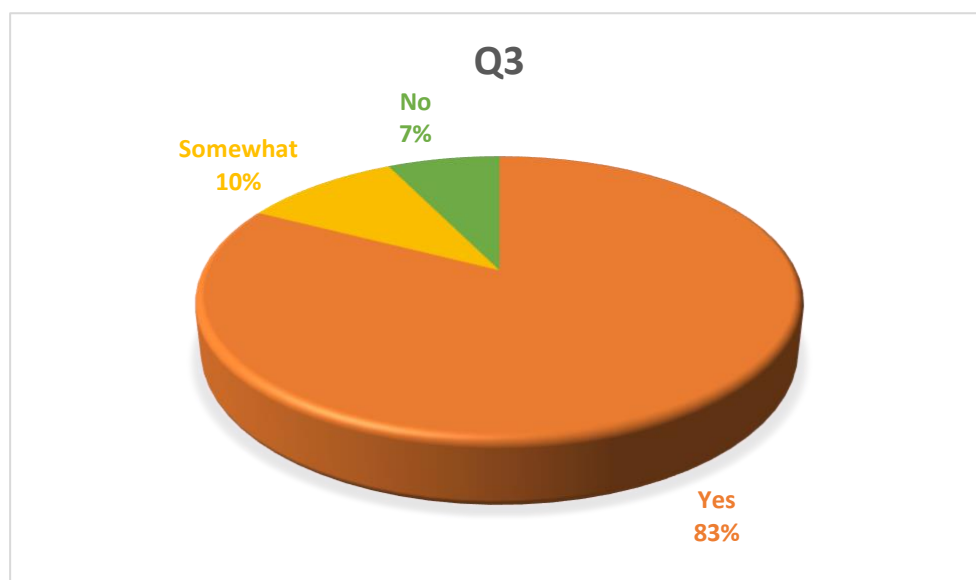


Figure 3 - Pie chart showing results for question 3

The description above was provided to allow all participants to continue the questionnaire on a more equal playing field. It was at this point that a trend in the results started to become more apparent, with 83% of people thinking that their community would benefit from a living wall. It would have been interesting to see what the results would have looked like had this question been asked before explaining what a living wall was. This would have indicated how many people were unaware of specific terminology without actually asking the question. Having established if the participants recognised the term or not it was important to include more detail on the topic for more clear results.

Question 4.

Have you directly benefitted from the installation of 'green' or 'living walls'?

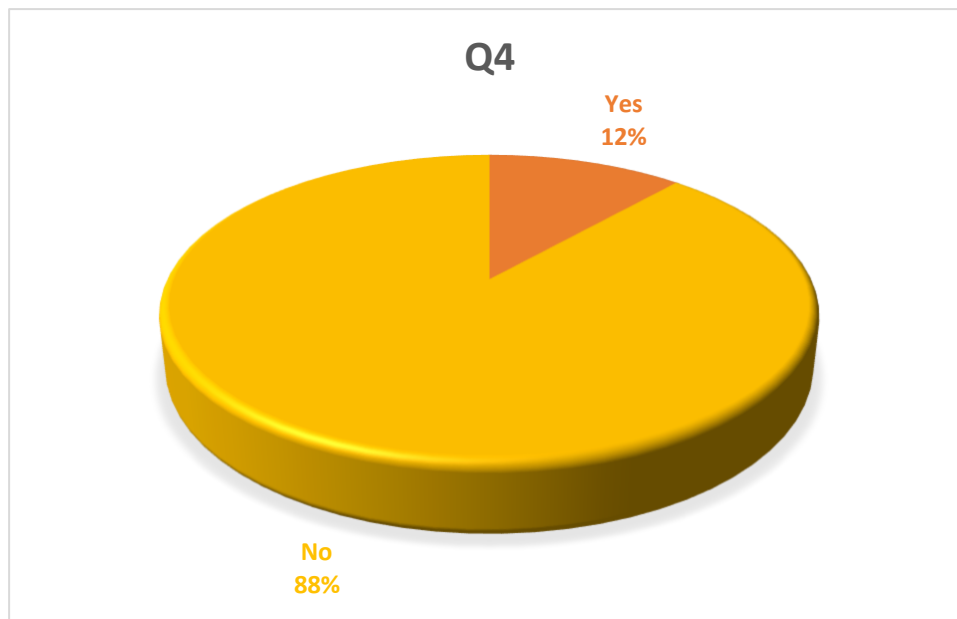


Figure 4 - Pie chart showing results for question 4

As the author of the questionnaire with knowledge of a recently constructed, pre-existing living wall in the area of the target audience, this question was designed to narrow the results that had already been accumulated. 88% of the participants did not believe they had directly benefitted from a living wall despite living in the area of one. Was this because they did not feel like they had experienced benefits from a living wall or simply because they did not know there had been one built within the local area? This filter question was designed to separate any participants from the group based on if they had any previous experiences with living walls. It was confirmed that at least 12% had some experience with a living wall whether it be locally or elsewhere. This would help support the answers for question 5 in more detail.

Question 5.

What benefits do you feel 'green/living' walls offer to your community?

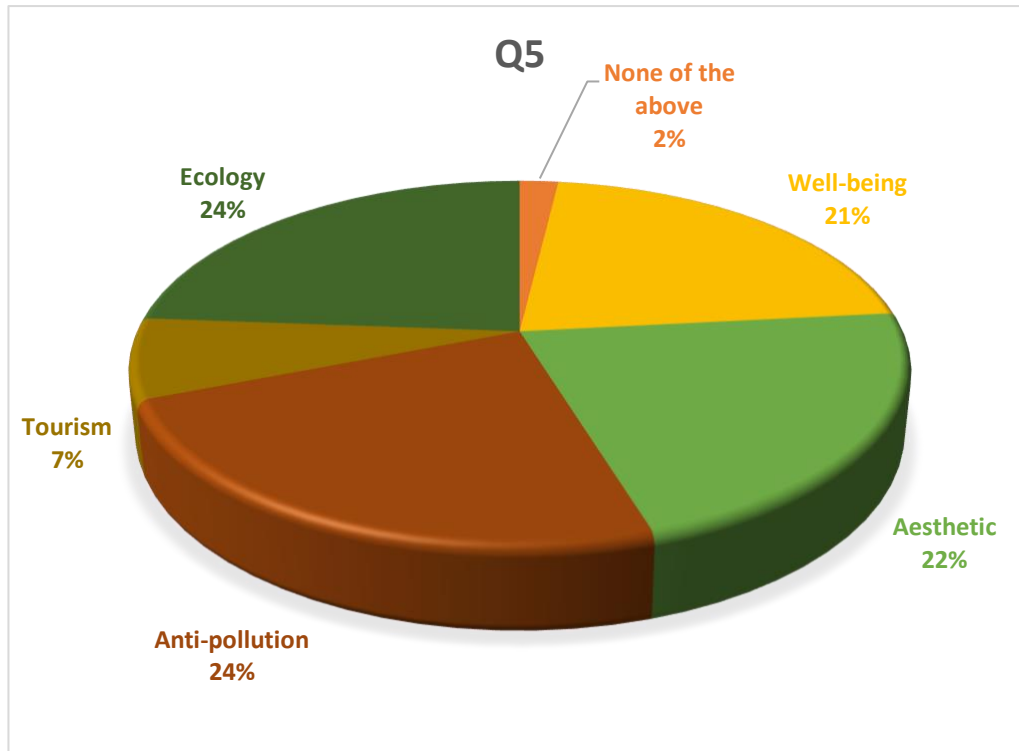


Figure 5 – Pie chart showing results for question 5

Without offering any additional information prior to this question, it was intended to analyse what information the audience might have previously learned or understood about the topic. The pre-selected answers would guide some participants if they were unsure, additional options for ‘none of the above’ and ‘others’ were also provided. This was done to offer individuals the opportunity to voice an additional information if necessary. The question was multiple choice, with more than one answer that could be selected.

Question 6.

Do you feel the introduction of ‘green/living’ walls directly benefits you as part of the community?

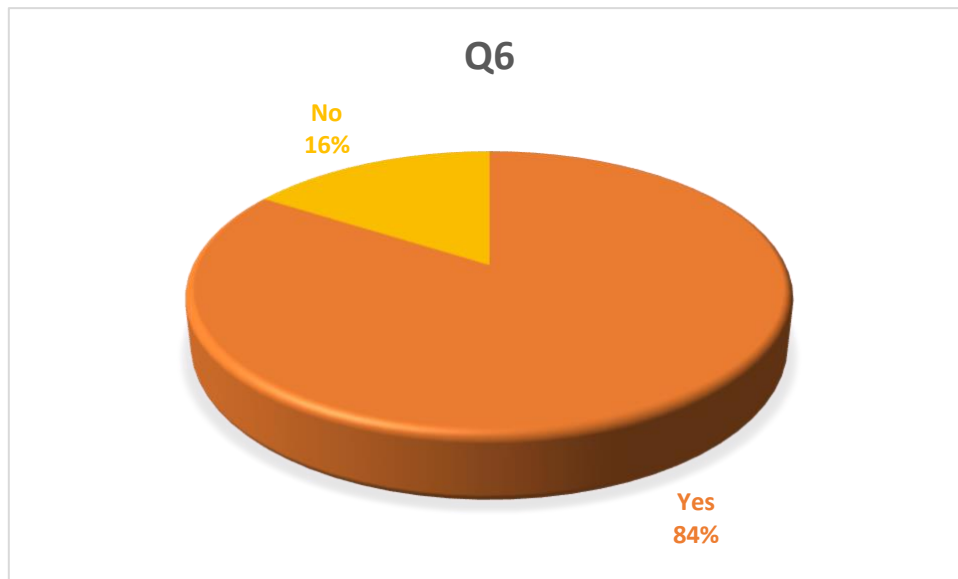


Figure 6 – Pie chart showing results for question 6

The purpose of this question was to further analyse how the audience perceived the topic had directly affected them, having just provided some of the benefits that exist as a result of a living walls in Question 5. Additionally, it was used as a tool to confirm or deny whether the audience was aware of this construction method in their area and if this conflicted with the answers provided in Question 4. The results seen in **Figure 6** are the complete opposite to those seen in **Figure 4** suggesting that the participants had now changed their opinion based on learning some of the benefits of having a living wall.

Question 7 and Question 8.

Are ‘green/living’ walls something you wish to see more of in your area?

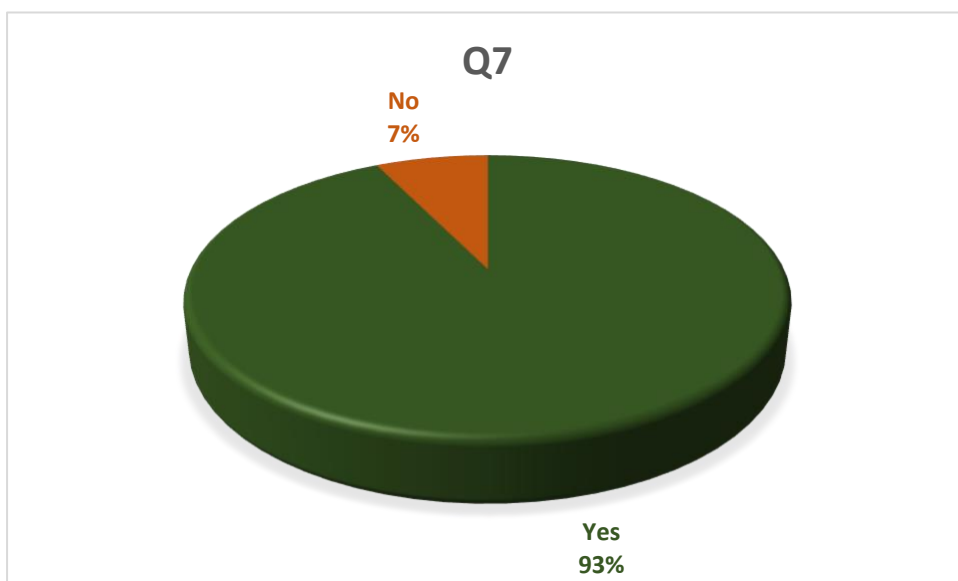


Figure 7 - Pie chart showing results for question 7

The final two questions were designed to collate and compare the audience's overall stance on the topic. Question 7 was given prior to some additional cost information to obtain the audiences initial opinion on the subject and question 8 was used to confirm their stance following a rough guide on build cost. As the questionnaire was to be carried out by people both in and out of the construction industry it was vital to ensure the information provided in-between questions was not overly complex or deterring in nature. Having full participation on both questions would be important in the final analysis.

The statement provided before questions 8 is as follows.

“A 'Green/Living Wall' can cost between £300 - £500 per square metre to build in the UK. This includes plants, integrated systems, and production.” (Jilly, 2014)

Knowing a rough guide on cost, is this something you would still consider beneficial to your community specifically?

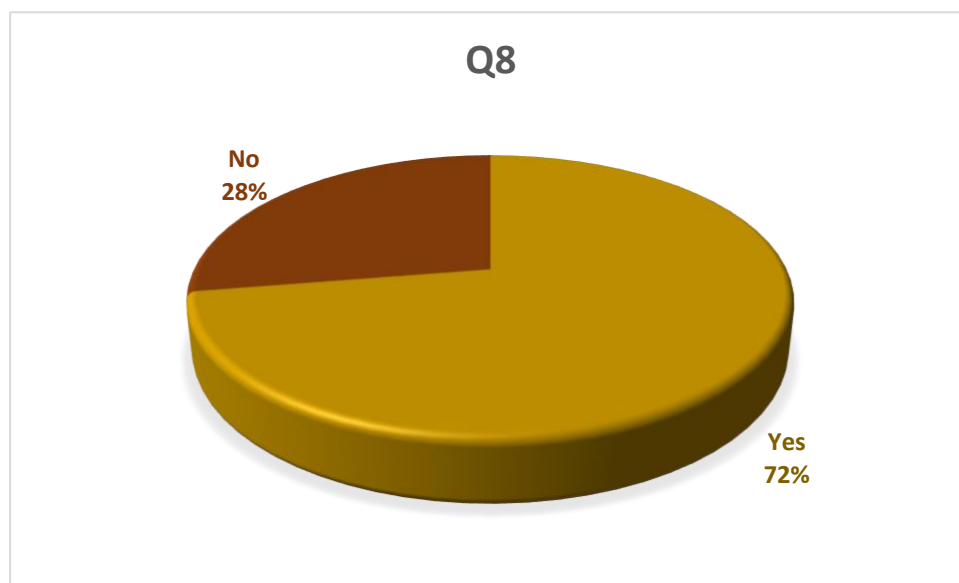


Figure 8 – Pie chart showing results for question 8

Chapter 4

Results vs. Literature

Following the results of the questionnaire and previous research it is apparent that people, whether aware of it or not, lean towards a greener environment. When the locals were faced with information on build cost for living walls there was a decrease of 21% in people wanting to still see more of this type on construction in their area. This is a smaller drop in percentage compared to what was anticipated. The results show that although 2 forms of living walls have previously been installed in Swansea, only 12% of participants had been directly affected by them and this did not deter people from wanting more. In fact, 93% were keen to see more of these types of walls in their local area before any cost information was provided. The aim of the questionnaire was to establish if local people would agree with or back the installation of these walls, without full information on their benefits, cost, and maintenance. Theories found in the literature review would suggest that people naturally have a pull towards greenery, as it offers spikes in peoples well-being, and it seem these theories have been proven right following the results. As a total of 45% of people confirming they did not recognise or understand the term living wall, with only 3% fully acknowledging what a living wall is, to a result of 72% wanting this construction type in their area by the end of the questionnaire. By providing small hints of information on benefits and cost it was to test the participants mind over matter. By offering information that might change their perspective either for or against living walls in hopes to see if this would change the outcome. However, it seems people's natural and possibly unconscious desire to surround themselves with greenery outweighs concerns such as cost.

This subject leans towards the question of whether the construction industries habit of cost over value is justifiable. The people habituating the buildings and places the construction industry create are prepared to pay the cost of a better well-being. It doesn't seem that the industry values end users' opinions, well-being, and judgement over upfront cost. The results show undoubtably that majority participants began the survey with no understanding of the subject and with little information given, they still opted to see more of this construction type in their area.

Chapter 5

Reflection

Carrying out this level of research with input from both existing literature and curated questionnaire and comparing them has been interesting and tasking. Research using historic information and previously proven theories allows for arguments to be made both ways. Introducing a questionnaire and the results to compare directly to literature reviews requires more skill. Reflecting on the literature, there was ample information and sources available on the connection between plants and greenery to human wellbeing. Various types of research and experiments have occurred over decades proving the natural benefits of introducing a greener work or living space. As most of these types of research were carried out in working conditions, I created a questionnaire in hopes to find out if these theories still stood strong when not directly affiliated with workspaces. The main objective of the questionnaire was to find out more on local people's perspective who aren't linked to the construction industry on this method of construction. The results not only confirmed the theories but also backed the idea that this was a majority's response, regardless of cost. Having carried out this questionnaire, it was originally planned to also interview industry professionals on the topic as well. As there is short timeframe on this piece of work it was not possible to carry out both. To finish this work efficiently and to use a faster source of information the questionnaire was chosen over interviews. The decision to use a short questionnaire was chosen to also reduce time. In future instances, this would have been a more in-depth survey and with more options for written replies. This ideally would've given a clearer view on the local's opinions and stance and might not have been so guided or influential. A more focussed approach on people who have been directly involved with or affected by the already built walls in Swansea could have yielded an altering approach or argument to the research as well. Any companies or individuals with first-hand experience with either the construction of, or final product might have held differing opinions. Having both the literature and independent research conclude on very similar outcomes didn't leave much space for countering points. From previous work, it is important to always consider both sides of the argument before making a verdict on any topic. Not having that counter argument on this topic could be a factor of there not being much of an argument when such positive results come from a public questionnaire.

Overall, if there was more time on the subject there might have been a different outcome. Now having a better understanding on how local's feel towards the construction method it isn't fully feasible to expect that counter argument. Other research and experiments

might confirm this, however. Further research into industry opinion is lacking throughout this report and possibly it's biggest downfall.

Chapter 6

Conclusion

To conclude the report, it is apparent that both the literature and personal research carried out on this topic align with each other. The repeated results confirm that the introduction of living walls to Swansea city is not counterproductive. With statistics from the questionnaire showing a clear stance from residents that this method of construction is not only wanted in the area but would nearly be seen as a benefit regardless of cost. People and plants have a strong attachment known as biophilia, where the human instinct is to connect with nature (McCain, 2020). This tendency has proven to reduce stress levels in the brain and is a large part as to why so many people positively responded to the questionnaire. The thought of surrounding ourselves with more plants and greenery, regardless of where allows us to relax and create a better sense of calm (Foyster, 2020). Health ultimately is wealth, and it seems this is a consensus between people when it comes to greener spaces no matter where or how much it costs.

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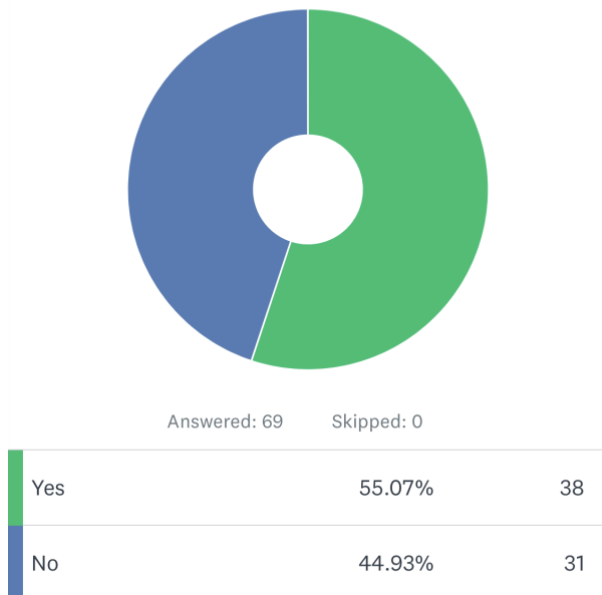
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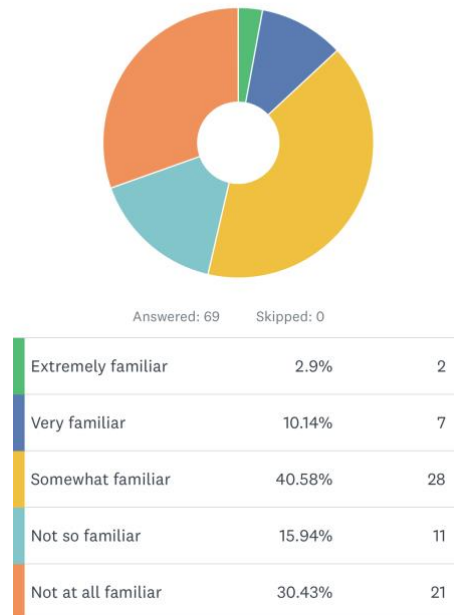
Appendices

Appendix 1 – Full Survey

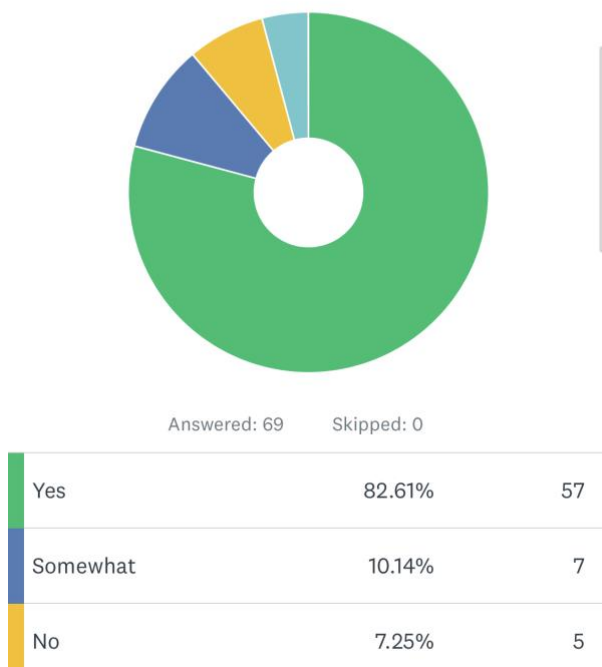
1. Do you recognise or understand the term 'green wall' or 'living walls'?



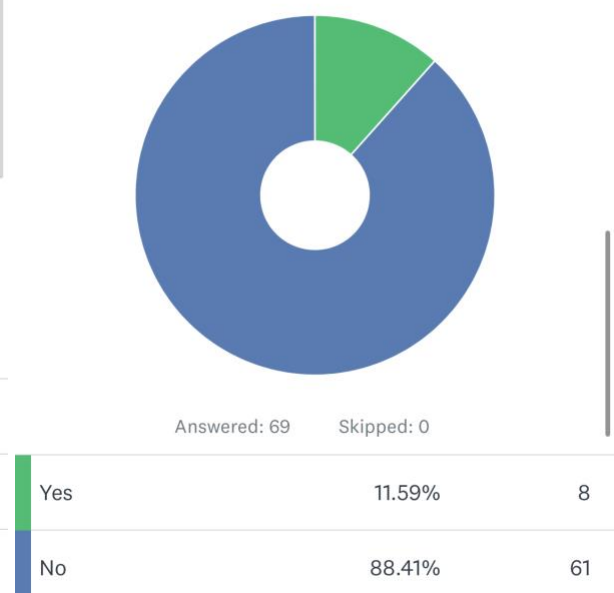
2. How familiar are you to the terms 'green walls' or 'living walls'?



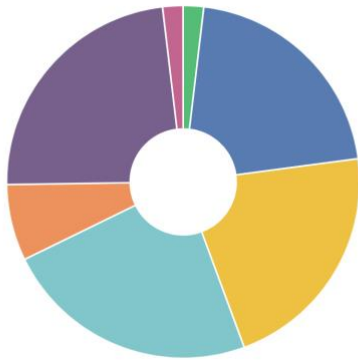
3. Given a brief description of 'green/living walls' do you feel this is something that would benefit your community?



4. Have you directly benefitted from the installation of 'green' or living walls'?



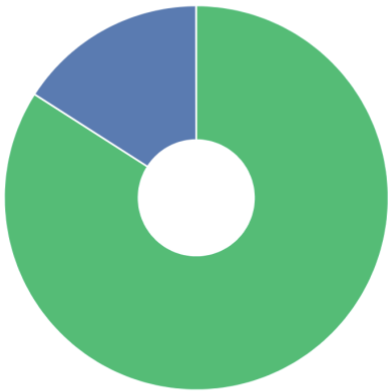
5. What benefits do you feel 'green/living walls' offer to your community?



Answered: 69 Skipped: 0

None of the above	5.8%	4
Benefits to well-being	65.22%	45
Upgraded aesthetic	66.67%	46
Offers anti-pollution benefits	72.46%	50
Attracts tourism	21.74%	15
Benefits ecology	72.46%	50

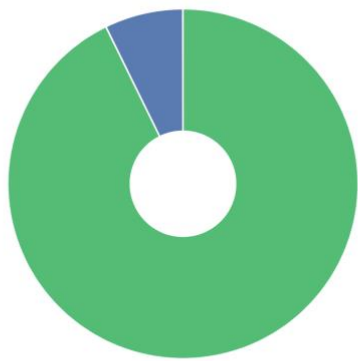
6. Do you feel the introduction of 'green/living walls' directly benefits you as part of the community?



Answered: 69 Skipped: 0

Yes	84.06%	58
No	15.94%	11

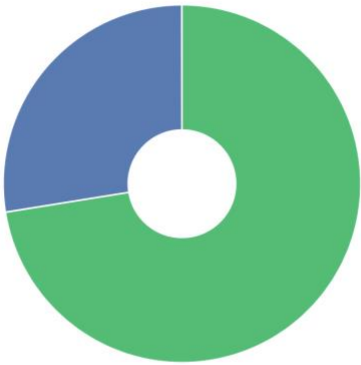
7. Are 'green/living walls' something you wish to see more of in your area?



Answered: 69 Skipped: 0

Yes	92.75%	64
No	7.25%	5

8. Knowing a rough guide on cost, is this something you would still consider beneficial to your community specifically?



Answered: 69 Skipped: 0

Yes	72.46%	50
No	27.54%	19