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Barriers to High-Performance Building (HPB) Incentivisation in Malta

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Abstract:

Purpose: *The purpose of this study is to concentrate on the technical and non-technical hurdles to High-Performance Buildings (HPB) in Malta. As a result, the study aims to analyse a variety of non-technical barriers, with a focus on current policies and practices, stakeholder roles the demand for HPB, incentives, and economic aspects. It also identifies the traits of a high-performance building and highlights advantages for construction over traditional structures.*

Design/Methodology/Approach: *Purposive sampling was employed as part of a qualitative data collection technique with input from policymakers, homebuyers, developers, and architects as well as local entity representatives.*

Findings: *The major barrier to HPB, according to research, is the public's lack of awareness, which marks a lack of demand and a perception of high starting expenditures, having a direct impact on the developer's final profit. Practicality/originality: The findings of this study indicate that there is a clear need for information campaigns by local governments, the national government, and private businesses, including architectural firms, businesses that specialize in consulting on the topic, businesses that sell supplies, amongst others about this knowledge area. Other benefits besides cost and energy savings should be the emphasis of public comprehension if successful campaigns are to meet EU targets. It would assist the process to better publicise other advantages such as those connected to environmental, mental, and psychological health. Additionally, all pre-contractual project requirements for new construction should be focused on achieving acceptable levels of energy efficiency and the Planning Authority should enforce these requirements as a routine practice to get a building permit. To achieve the minimum standard energy efficiency, an independent third-party authority (non-governmental related) should conduct the assessments related to energy efficiency during the planning process. This certifying body should assist clients in spending time studying the site during the design phase. The energy performance certificate (EPC) procedure needs to be concentrated on the beginning of a project than on its conclusion, and both the seller and the homeowner should be obligated to follow the suggestions made in the EPC, with updates through a property logbook.*

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Practical Implications: *The building sector is one of the major global producers of greenhouse gases and carbon emissions. Given that construction is one of the main contributors to the local economic growth, this environmental concern is even more concerning in the local context. The EU directives and the national action plans push for sustainable development in all EU member states, with a strong focus on creating greener buildings, moving toward Nearly-Zero Energy Buildings (NZEB) and Zero Energy Buildings (ZEB), and creating buildings that are more energy-efficient and self-sufficient.*
Originality value: *The defined goals designed to reduce carbon emissions and greenhouse gases encourage this. It is also recommended that these emissions be minimized in building design.*

Keywords: *High performance building, non-technical barriers, contruction.*

JEL codes: *R30, R32.*

Paper type: *Research article.*

1. Introduction

The impact of industry and infrastructure on the environment has been identified as a significant contributor to climate change and global warming (Evans, 2019). According to the World Green Building Trends Report (2018), it was found that the construction sector is anticipated to generate buildings with a greater emphasis on environmental sustainability. In contrast to other sectors such as transportation and manufacturing, the construction business, particularly in the domain of residential buildings, exhibits the highest level of energy consumption on a global scale (Liang, Wang, Royapoor, Wu and Roskilly, 2017).

These findings prompted more research endeavors focused on enhancing energy efficiency in buildings through the exploration of new characteristics associated with High-Performance Buildings (HPBs). The recent trend towards the construction of environmentally sustainable buildings may have been motivated by the European Union's efforts over the past decade to encourage the development of energy-efficient and self-sustaining structures, specifically through the promotion of Nearly-Zero Energy Buildings (NZEB) and Zero Energy Buildings (ZEB) (Science Communication Unit, 2013).

The aforementioned transition has also resulted in heightened recognition of the imperative for establishing a construction sector that is rooted on sustainable development, encompassing the three fundamental pillars of society, economy, and environment (McCarthy, 2021). The objective of this study is to establish the defining attributes of a high-performance building and underscore its overarching advantages in comparison to traditional buildings.

Additionally, this study aims to uncover the elements and constraints that impede local developers in the private sector from attaining sustainable structures. This investigation will primarily focus on policies, encompassing current practices and enforcement measures.

2. Literature Review

Various terminologies refer to High-Performance Buildings, including Sustainable Buildings, Green Buildings, Intelligent Buildings, energy-saving houses, passive houses, zero-energy houses, plus-energy houses, zero-emission houses, energy self-sufficient homes, and active climate houses, amongst others. These terminologies mainly relate to low energy consumption, low emissions, sustainability, and green aspects, given that the need for sustainable buildings is increasing worldwide attention (Berardi, 2013).

A broader perspective of a meaning to a high performance building is defined in the United States. The US Energy Independence and Security Act 2007 define a high-performance building as: "A building that integrates and optimizes on a lifecycle basis all major high-performance attributes, including energy and water conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations" (Public Law 110–140 110th Congress, 2007).

Several nations across the globe have formulated standards and certifications that serve the purpose of evaluating the energy efficiency of buildings, while also incorporating a comprehensive analytical methodology. In various European and international contexts, certification is established on the basis of Life-cycle Analysis/Assessment (L.C.A.).

This approach encompasses the optimization of building processes with the aim of reducing waste, taking into account the environmental consequences of a product throughout its entire life cycle, from resource extraction to disposal, commonly referred to as "cradle to grave." The strategy employed in this context is rooted in the waste hierarchy, which encompasses the principles of waste prevention, reuse, recycling, recovery, and disposal.

It entails adopting a comprehensive perspective while evaluating the construction process, starting from the extraction of materials during the structure's origin and extending to the proper disposal of materials after the building reaches the end of its useful life. In addition to conducting a comprehensive evaluation, the assessment also incorporates the subjective experience of the building's occupants in terms of internal comfort. There are several certification systems that are utilized on a global scale. Among them, the LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) certifications enjoy significant recognition.

Both certification schemes are utilized in both residential and non-residential contexts. The evaluation takes into account multiple dimensions, with a specific focus on energy and water consumption, health and wellness, pollution levels, transportation systems, material usage, waste management, ecological impact, and organizational procedures.

Aiming to encourage the European citizens to contribute towards reaching the established targets, amended EU Directive 2018/844/EU was issued. This reiterated measures to be adopted by each member state to increase the number of buildings achieving the current minimum energy performance requirements and increasing their efficiency, thereby reducing their energy consumption and carbon dioxide emissions.

This was included as part of the national action plan to be delivered by the Minimum Energy Performance Standard for new and existing buildings and encouraging the concept of NZEB and ZEB standards for new buildings. This is of utmost importance in Malta as a nation, amongst other countries, failed to reach the targets set in the Kyoto Protocol to be reached by 2020. These were later extended to 2030. According to the report published by the European Environment Agency (EEA) Malta is the only EU country that has missed every single emissions target since 2013 (European Commission, 2021).

According to Cramer (2017), there is an argument that the climate is undergoing changes, which consequently necessitates adaptations in design and the mindset of individuals. In order to achieve these objectives, it is imperative to undertake a comprehensive overhaul of the local built environment, with the aim of fostering a healthier and more sustainable ecosystem (The Malta Chamber of Commerce, Enterprise and Industry, 2021).

3. Methodology

The primary objective of this study is to identify possible barriers and deficiencies that impede developers from making investments in High-Performance Buildings (HPB) within the private sector, using qualitative research as a methodological approach involving a naturalistic inquiry, intended to acquire the comprehension of social phenomena within the building sector.

The pilot study conducted an analysis of policies, costs, incentives, demand, and the many roles played by stakeholders. Data was obtained via qualitative interviews conducted with different actors who had expertise in the building sector, particularly in medium to large scale initiatives. This involved conducting individual interviews to observe the responses of the participants. The study employed purposive selection approaches to choose a sample of people who met pre-defined criteria for the interviews.

The pilot study was considered important for improvement of the quality and efficiency of the main study. The research data was obtained by administering a specifically prepared questionnaire and it was conducted by drawing upon processes found through a comprehensive assessment of relevant literature.

The participants in the study were assigned specific codes to represent their respective roles: Policy Maker [P1], Representative from the Planning Authority [P2], Home Buyer [P3], Developer [P4], Architect [P5], and Representative from a Local Authority [P6]. The sample was terminated upon reaching data saturation. Prior to the commencement of the research, all participants were duly informed of the research objectives, thereby guaranteeing their anonymity throughout the study. Collated analysis was grounded in baseline data derived from the literature.

4. Research Results and Discussion

4.1 Awareness

Consensus was reached among all participants on the lack of public awareness regarding HPBs and the underlying principles of sustainable design and construction of environmentally-friendly structures. However, participants P1, P3, and P5 expressed optimism regarding the emerging level of awareness and familiarity with the concept of green buildings within the local community.

There appears to be an increasing level of public awareness regarding certain terms, such as energy efficiency and sustainable architecture. Nevertheless, participants P2, P3, P4, and P5 asserted that the general public commonly links the notion of sustainability and green buildings exclusively with cost-saving measures. These measures encompass the implementation of active technologies, such as solar panels, solar water heaters, roof insulation, or double-glazing.

However, they tend to overlook potential passive design solutions and other pertinent elements, such as indoor environmental quality. Participant P3 claimed that due to the expansive nature of the topic of HPBs and sustainability, as evidenced by several research endeavours, it is plausible that not all individuals possess the requisite technical knowledge or inclination to comprehend the associated concepts and construction methods.

In contrast, the developer (P4) argued that prospective property investors typically prioritize factors such as the internal spatial arrangement, design aesthetics, quality of finishing, and the cost of the property under consideration. The observed phenomenon can potentially be attributed to a deficiency in the public's awareness and engagement, as there appears to be a prevailing preference for the installation of double glazed windows and the insulation of exposed roofs.

Nevertheless, notwithstanding these requisites, it has been argued that the absence of those technologies within the prospective property would have no effect on the purchase, given that the home's design and cost align with the preferences of the potential buyers.

According to the developer (P4), it is believed that properties continue to be sold irrespective of the presence or absence of insulation. In consideration of this matter, participant P6 expressed the notion that individuals who construct their own residences may exhibit heightened awareness and inclination towards constructing environmentally sustainable buildings, or at the very least incorporating architectural elements and systems that promote energy efficiency.

This is due to the fact that developers are responsible for maintaining ongoing communication with the design team in order to incorporate design ideas that enhance internal spaces and promote energy efficiency. Homeowners stand to gain advantages from the inclusion of supplementary studies and expenses during the design phase.

This statement pertains to the findings of Nguyen, Skitmore, Gray, and Zhang (2017), who argue that the developer will not be the primary beneficiary of the return on investment associated with these systems and/or design considerations. Additionally, it is argued that the developers have a tendency to emphasize immediate financial gains over the long-term advantages.

According to participants P4 and P6, the public and other stakeholders within the construction industry associate the concept of HPBs with energy efficiency with the need to provide an energy performance certificate EPC during the property transfer which is considered mandatory in Malta. The developers who have the intention of selling property demonstrate awareness of the subject matter since they must provide an Energy Performance Certificate (EPC) as a legal requirement throughout the process of property transfer.

Regarding the absence of public consciousness surrounding the topic, a consensus among the interviewees (P1, P2, P3, and P6) was reached, emphasizing the paramount importance of fostering a greater comprehension of the subject matter pertaining to HPB. Information regarding the concept of HPBs, their benefits, and how to achieve HPB in terms of both design (passive strategies) and technologies (active strategies) should be made available to be public to be knowledgeable on the subject.

Awareness of the resources available in the local market to achieve such criteria is also essential. Participant P5 suggested a general need for more significant strategic consideration in the initial phase of a project, especially when it comes to passive design strategies, which require proper planning to work around the natural elements and achieve a comfortable internal environment.

4.2 Barriers discouraging local developers to achieve HPBs

The following are the qualitative results obtained:

Bureaucracy in the planning application process:
The complexity of the planning process has posed challenges in navigating the acquisition of necessary permissions, as multiple stakeholders are involved in the consultation process. The acquisition of the required clearances and subsequent issuance of a building permit can be a time-consuming procedure, particularly in the context of medium to large-scale constructions. Consequently, bureaucracy has led to additional time delays and expenses (P4).

The situation can be disheartening for developers who are motivated to acquire the requisite permissions promptly in order to minimize any potential setbacks in concluding property sales at optimal profitability within a condensed timeframe. This pertains to the issue addressed by Architect Conrad Thake, who emphasizes that at the local level, architects tend to allocate an imbalanced amount of time to the planning process. In accordance with Thake (2010), the emphasis on acquiring building permits rather than prioritising design poses a hindrance to the cultivation of creative design that upholds environmental considerations and aligns with the surrounding setting.

Legal obligation towards designing HPBs:
Almost all participants (P1, P2, P3, P4 and P5) agreed that current legislation needs to be amended towards forcing the industry to provide HPBs, hoping these changes become standard practices in the design and construction of new buildings. Thus, the revised legislation would be more about the EU requirements and the targets set for Malta to achieve (P3). This relates to the concerns raised by the BCA and Chamber of Architects in Malta, with the latter claiming that the local regulations, focusing on the SPED, have failed in their objectives and targets set (Orland, 2019).

In contrast, participant P5 maintains the perspective that the existing regulations are satisfactory. P5 argues that the issue lies not in the regulations themselves, but rather in their execution, enforcement, and the absence of mechanisms for holding individuals accountable. Nevertheless, participants P1 and P5 argue that in order to justify the developer's incurred greater initial expenses, energy efficient solutions need receive enhanced backing through educational awareness and financial incentives.

This would ensure that the expenditures are perceived as acceptable and the expenditure is deemed worthwhile. Another issue highlighted is the need for revised legislation ensuring better enforcement of energy-conscious design.

However, this should not result in a further increase in the bureaucratic process of obtaining a building permit. In accordance with participant P4, the current practice

of getting a building permit is already tedious and time-consuming. Participant P2 thinks that energy efficiency assessment should be done by a different entity/authority other than the Planning Authority. A possible option mentioned is establishing specific standards and implementing a points system. A minimum value must be obtained in terms of energy efficiency for the Planning Authority to supply the necessary compliance (P2).

Current practices towards achieving EU targetns:
All participants agreed that current developments are not focused on achieving EU targets, particularly small to medium scale developments. According to participant P2, the local high-rise buildings designed by local architects and developers tend to be built with nearly zero carbon emissions. Conversely, participant P6 noted that throughout years of work experience, even in large projects, issues related to sustainability were rarely discussed at the initial stages of the project.

Participants P3 and P6 argued that in small and medium-scale projects, the developers rarely include sustainable technology in their buildings not to increase their initial cost. This is because any mechanical technologies can easily be retrofitted at the expense of the homebuyer if the latter wishes to improve the energy efficiency of their property.

Moreover, as indicated by participant P5, the long-term financial advantages associated with the creation of (HPBs) make them particularly attractive to the high-end market. Ultimately, participant P2 contended that if the local architect and developers are capable of attaining elevated energy efficiency standards, there should be no justification for failing to achieve comparable outcomes in small to medium scale projects.

However, participant P2 expressed the view that in practice, homeowners face limitations in installing some technology on their properties due to the prevailing trend of constructing and selling apartment-style complexes. For instance, the installation of photovoltaic (PV) panels and roof insulation may not be feasible for all individuals, as the majority of apartment dwellers lack ownership rights over the roof.

Another aspect that has been addressed is that retrofitting may not always be a viable choice. Installing insulation on exposed walls of internal shafts, in accordance with the minimal standards outlined in sanitary rules, can potentially lead to concerns related to sanitation and air ownership.

Participant P5 asserts that a majority of local developers prioritize cost reduction as a means to maximize profit, rather than actively striving to meet the targets set by the European Union. Participant P3 emphasized the necessity of making environmentally-conscious design obligatory, particularly in the context of

developing extensive residential complexes, due to the significant impact it can have on the surrounding community, infrastructure, and natural surroundings.

Energy efficiency building certification and its intent:

The Energy Performance Certificate (EPC) is a standard procedure when transferring property to third parties. A registered assessor is appointed to carry out the necessary evaluation of the property, prepare the EPC and eventually present it to the notary to be attached with the deed during the transferring of a property. However, in accordance with participant P4, this procedure is considered to lead to further bureaucracy in building construction.

Despite the inclusion of potential recommendations within the Energy Performance Certificate (EPC) to enhance the energy efficiency of the assessed property, participants P1, P2, and P3 contend that these suggestions are non-mandatory and consequently tend to be disregarded, as the property transfer process proceeds irrespective of the EPC rating.

Hence, the absence of enforcement and responsibility on the part of the seller, be it a developer or a homeowner, to enhance the energy efficiency of the building undermines the intended importance of the Energy Performance Certificate (EPC) as a legal procedure (P2 and P3). Participant P4 expressed the viewpoint that the responsibility to adhere to the guidelines should not rest solely on the seller, but should also encompass the new owner's need to update the certificate.

Nevertheless, participant P6 made mention of the EPC as a secondary consideration. There is a lack of emphasis on prioritizing the achievement of enhanced energy efficiency at the early phases of a project, prior to submitting a construction permit application to the Planning Authority. The issuance of the appropriate certification should be conducted during the planning phase subsequent to an evaluation performed by a qualified individual, akin to other consultations conducted during the planning stage.

Additionally, the assessment and recommendations of the EPC rely on the installation of the energy-efficient air-conditioning system, which in practice should not be the solution aiming to prevent buildings from relying on non-renewable energy sources to ensure efficiency (P3). In accordance with participant P2, the EPCs prepared do not reflect the actual scenario of how much each development is truly energy efficient. Participants P1, P3 and P5 agreed that the evaluation system to carry out such EPCs or otherwise should be revised, supported with stricter regulations and provide the relevant authorities the necessary power to enforce the implementation of the revised regulations.

If need be, enforcement on architects and developers is suggested to focus more on passive design strategies than active systems i.e. the air conditioning system (P3). The latter refers to the need for the designers to understand the building performance

by adapting different design factors and technologies under differing conditions during the initial stages of development.

Provision of incentives towards HPBs:
The participants expressed a favorable perspective towards the necessity of incentives to promote the development of HPBs and proposed the implementation of tax benefits. Nevertheless, it has been emphasized that the attainment of HPBs can be accomplished through several techniques that do not entirely depend on non-renewable sources (P1).

Current incentives are targeted at homeowners rather than the developers (P2 and P4). This practice can be discouraging for the developers as they are the ones who spend a considerable amount of money from the initial stages of a project. This is of more significant concern with the current issue related to the constant increase in materials prices (P4). Therefore, these factors tend to strongly dissuade developers from investing in or wanting to engage in obtaining HPBs. A substantial financial investment will be made initially to enhance the energy efficiency of the structure.

However, the individuals in question will not be the primary recipients of the cost savings resulting from the utilization of resources (P2 and P4).

If the developers were given sufficient resources, mainly financial aid to design and construct new developments that were more energy-efficient, the homebuyers would not need to apply for any incentive during the occupation phase. The developer would have already acquired the necessary design solutions (P4). In accordance with participant P2, incentives such as partial refunds of taxes paid by developers and homebuyers may serve as a practical incentive.

However, incentives aimed to regularize the market price should be avoided; the potential homebuyer would still suffer in the end as the seller would increase the selling price to compensate for the loss in the incentive intended to regularize the market.

Regarding current incentives, there are still concerns about whether these are practical considering the current type of developments being built. Referring to the incentive related to installing photovoltaic panels, these do not seem entirely adequate. The most common development being built within the private sector is apartments block without any airspace ownership to install any photovoltaic panels at roof level (P3). Thus, schemes such as this are limited to specific building typologies such as villas, bungalows, and terraced houses.

Participant P6 mentioned that buildings that are designed as high-performance buildings should be awarded or rated and published for ease of reference and for the public to appreciate. In addition, this can serve as a marketing strategy to encourage developers to invest in HPBs.

Economic perspective in terms of costs and profit:
The policy maker (P1) contended that the financial dimension is restricted to expenses incurred for the installation and construction processes, encompassing the costs associated with human resources throughout the design and construction phases. The issue appears to be consistently referenced in the responses provided by nearly all participants.

According to the developer (P4), contemporary technologies and novel materials continue to exhibit higher costs in comparison to conventional alternatives. In addition to this, the geographical location of Malta serves as a constraint, as it exerts an influence on the expenses associated with the transportation of imported commodities.

In accordance with participant P1, the mindset of the local developers within the private sector tends to focus on making a profit by incorporating the possible number of residential units rather than focusing on other essential aspects, including energy efficiency, better layout and amenity. This issue correlates to the concern raised in the study by Perit Vincent Pieri (Leniker, 2010), whereby the design of the development depends on who is the client as developers, whose intention is to sell, will work to achieve maximum profit.

A different concern that was raised forth pertained to the insufficient public demand for HPB. Furthermore, it is often believed that if these stipulations lead to increased initial expenses, so there is a lack of interest in implementing such regulations. The primary objective is to generate a financial gain, thus making it impractical for the developer to allocate resources and compel the architect to create a design optimized for high-performance buildings (P4). Participant P6 provided a detailed explanation of this feature by discussing two blocks of apartments located on the same street.

One block was constructed using a normal way, while the other block was created using a high-performance building (HPB) approach. The apartment block was likely developed using traditional methods in order to expedite its sale, as the market value of the alternative block tends to be higher. There has been a contention that the construction industry has evolved into a highly competitive domain, with intense rivalry observed among local developers, architects, and building contractors.

This circumstance has generated heightened demand on these individuals and other relevant parties to efficiently strategize, acquire necessary authorizations, construct, and market a property within a condensed timeframe and at a justifiable cost in order to proceed with subsequent investments (P4).

From the homebuyer's (P3) perception, this sector is regarded as "too greedy," arguing that it focuses on the potential income generated from the development. As a result, the majority has little to no interest in changing the building practices and

materials used for the past decade. However, developers' lack of interest in investing in HPBs is perceived differently from other participants.

In accordance with participant P6, the developers may be reluctant to add the additional costs to the homebuyers as any additional costs done by the developer would then be reflected in the selling price. Despite this, it is argued that properties constructed in the early 80s included passive use of materials and designs related to high-performance technology and performed well in terms of energy efficiency (P2).

This concept is closely aligned with the suggestion put forth by Nguyen, Skitmore, Gray, and Zhang (2017). The authors argue that due to the belief among customers that constructing such buildings involves costly features, the design team lacks motivation to engage in the design of such structures.

This urges the need to increase the enforcement to oblige developers and architects to achieve specific design criteria by implementing passive, active strategies or both, particularly in new buildings, rather than leaving it optional and up to the occupants as per current practices (P3). Optimistically, participant P1 mentioned that the benefits of the HPBs will outweigh the initial costs required for implementation in the long term.

Site configuration limitations:

In accordance with participants P4 and P5, the plot size, scarce land, type, and scale of development are considered limitations within the local private sector, restricting any exploration of such high-performance considerations. Furthermore, sites tend to be developed as individual plots, which can be more challenging for the design team to adopt specific passive design considerations (P5).

This is because, locally, most of the developments, which are small to medium scale projects, are one abutting the other; thus, limiting the design team with plot orientation and the surrounding commitments given that the plot cannot be rotated, for instance. However, the design team should consider the size and type of apertures used depending on the orientation, introduce insulation, add design features for shading as part of the architecture, etc. (P3).

Participant P2 mentioned that developments with a larger plot size take advantage of this and may be obliged to design such developments as HPBs as suggested by participant P3. Furthermore, larger plot developments have the opportunity to introduce further landscaping as part of the design. Apart from creating outdoor areas, such landscaping can also be used as a design feature to provide cooling and shading to the surrounding development (P2),

In a similar vein, high-rise structures offer increased design freedom through the strategic placement of lifts and shafts facing the southern direction, while maximizing the rentable area, such as offices, by incorporating greater openings

facing the northern direction. Therefore, the inclusion of lifts, shafts, and cores serves to mitigate the impact of heat emanating from the south-facing façade.

Therefore, the design team in large-scale developments have greater freedom in the design layout and incorporates a higher number of passive methods compared to small to medium scale developments. The plot sizes of large-scale developments are larger, specifically P2, P4, and P6. This pertains to the concern made by Marro (2018) on the efficacy of passive design in relation to the orientation of buildings for improved solar management.

Expertise to achieve HPBs:

Participant P4 contended that the regional construction sector faces constraints in terms of skilled workforce availability for executing such projects, particularly among smaller construction firms. These entities tend to rely on conventional construction methods due to their tendency to undertake similar projects in terms of nature and magnitude. This operational methodology guarantees the completion of tasks in the most efficient manner by consistently employing identical procedures.

However this constraint restricts the labour force from getting exposed to novel technologies and materials. Nevertheless, it is important to acknowledge that there is a potential for huge construction enterprises to possess skilled staff, both in the stages of design and construction.

However, there continues to be a low demand for the provision of HPBs, which consequently restricts the availability of experienced professionals in the respective field (P2). In addition to this, there exists an argument that claims that the developer, realistically the customer, assumes responsibility for funding the project and ultimately possesses the authority to make the final determination. If the suggested actions during the design and construction phases prove to be costly, rendering a project unfeasible or surpassing the financial constraints of the developer, it is likely that none or a portion of these measures will be implemented (P2).

Furthermore, participant P6 added that this sector is market-driven. Certain items and technologies have a higher degree of marketing importance, thereby capturing the attention of developers who then demonstrate an increased propensity to adopt and utilize them. Participant P6 added that the architects are the main drivers of the technology and the design for HPBs.

However, participant P6 argued that junior architects are not well prepared in the university regarding environment design in building as their studies are more focused on engineering and aesthetics. It is argued that education, through constant promotion and regular training to the personnel involved in the entire lifecycle of a project, i.e., during the initial stages of the project, is integral to changing the shift in current practices. Investing in the personnel can provide better judgment when discussing a project with the developer highlighting solutions as part of the overall

design, current technologies, materials, and competent contractors with skilled labourers able to conduct good quality work (P3). However, participants P2, P4 and P5 argued that presently there is qualified personnel; however, their knowledge tends to be more theoretical rather than practical, given there is no demand and interest by the developer to design for HPB.

5. Conclusions, Proposals and Recommendations

5.1 There exists a limited level of public awareness of the subject matter of HPBs, encompassing their necessity, advantages, and the means by which to attain such structures. In general, the public tends to associate HPB primarily with cost savings in the context of sustainable buildings, rather than recognizing its other core advantages, such as enhanced indoor comfort and improved energy efficiency.

5.2 Local developers within the private sector tend to focus on cost reduction to maximize profit rather than on achieving HPBs and EU targets.

5.2.1 The energy efficiency targets established by the European Union are not considered a top priority within the local building industry, particularly among the private sector. The design of contemporary developments sometimes disregards the imperative of including sustainability targets and promoting energy efficiency. The current market lacks demand, with no legally mandated requirements other than the necessity of providing an Energy Performance Certificate (EPC), and traditional construction techniques are more cost-effective.

5.2.2 There is a tendency for any high-performance design considerations to be limited to high-rise buildings, with little to none being taken into account for small-to medium-scale projects. Few major projects, such as high-rise buildings, are being built to be nearly or with zero carbon emissions. The lack of design considerations related to energy emissions is highly influenced by the expectation of the development being built and the end user. The design of high-performance buildings is commonly linked to substantial upfront expenses, which are offset by long-term financial benefits.

Therefore, in the event that the developer does not want to retain the role of the end-user and instead plans to sell the development for financial gain, the developer will not derive any advantages from including design considerations that aim to achieve HPBs. Consequently, the developer will be reluctant to allocate time, resources, and funds towards attaining HPBs.

5.2.3 The perception is that some mechanical technologies and other materials can easily be retrofitted at the homeowner's expense during occupancy. Thus, adding to the lack of interest from developers in providing HPBs.

5.2.4 Local developers in the private sector often prioritise maximizing profit margins by minimising expenditures on design consultations with the design team, thermally efficient construction materials, skilled laborers, and renewable energy technology. Regrettably, the emphasis placed on maximising profit often leads to the production of substandard quality developments.

5.2.5 In Malta, the building certification for energy efficiency is considered a standard procedure to be only adopted during property transfer. For some stakeholders, this process leads to further bureaucracy, considering that the EPC is an afterthought process, and no one is giving its intended priority during the planning process. Moreover, any possible recommendations for improvement indicated in the EPC tend to be ignored, as these are not obligatory to adopt. In contrast, most of these recommendations are often dependent on installing renewable energy systems, which is not always practical due to the plot's limitations and its surroundings.

5.3 The main barriers identified that discourage local developers within the private sector in achieving HPBs include:

5.3.1. The process of acquiring a building permit is characterised by a significant investment of time, thereby dissuading developers from allocating additional resources towards collaborating with the design team in order to enhance the design with HPB features.

5.3.2. Initial costs related to human resources, modern technology, new materials, and permits are very high, reducing the profit margin. Such reduction in the profit margin tends to be contrary to the focus of the local developers within the private sector, who aim to build and sell for profit within the shortest time possible.

5.3.3. The transportation costs and time delays in importing goods to Malta are influenced by its geographical position and limited availability of raw materials. The escalating transportation expenses would have an impact on the developer's profitability. Consequently, the supplementary charges are typically incorporated into the prevailing market price.

5.3.4. There is limited knowledge on the high-performance buildings by the public and developers. This results in a lack of demand from the public to own a HPB.

5.3.5. The scale of the proposed development plays an important role when designing, given that small-scale projects may restrict any exploration of such high-performance considerations. Such restrictions may be because designing individual small plots tend to be more challenging for some developers and architects to adopt specific passive design strategies.

5.3.6. Following L.N. 162/16, the planning process is considered more tedious to obtain a building permit. In addition, other governmental entities are being involved during the planning stage to assess the application resulting in further delays with the request for information and re-consultations. Hence, this process is perceived as lengthy to obtain the necessary permits, resulting in additional time delays and costs. In addition, these processes discourage a potential developer from adopting any different design considerations, resulting in further delays and costs.

5.3.7. At now, there exists an absence of incentives specifically tailored to developers operating in the private sector, as the prevailing incentives predominantly cater to homeowners.

5.3.8. The local construction industry is experiencing a shortage in the supply of competent personnel who can deliver these types of developments. In addition, most small construction companies tend to use traditional construction techniques, limiting their employees from being exposed to new ideas, technology, and materials.

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