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Environmental Health Predictions for Fire Resistant and Corrosion Protection Measures for Community Health Tourism Building Facilities Due to Climate Change

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Abstract: - The recent expansion of green tourism building facilities and warehouse capacities entails the installation of integrated community health tourism facility for cultural events, safe mobility, sport activities, agricultural and veterinary activities at old heritage buildings for public health, environmental health, green circular economy promotion within safe structures, which operations increase the occurrence of compartment fires involving flammable dangerous substances i.e biogas from sanitary biomass treatment for renewable resources, electricity and heating. The aim of this research is to compare and analyze the fire resistant materials of structural members and design economic solutions made of different structural materials for natural hazards and climate change. Useful results are presented for sustainable design solutions at integrated community health tourism renew facilities at old heritage buildings, applying proper utilities. Then, are examined the possibility of reinforcing the beams with carbon fiber lamellae and proposed additional fire protection requirements. The examining results present useful solutions for stakeholders. The study outputs enable warehouse designers, operators, stakeholders, investors and safety experts to ensure safe building facilities. Finally, sanitary digital drawing utilities, monitoring schemes are demonstrated for safe green designs so as to protect the examining building facilities at foundations or roof top levels from flood events and high temperatures due to climate change and extreme weather events.

Keywords: safe community health building facility; monitoring schemes; climate change; heritage buildings; environmental health; safe green tourism designs.

I. Introduction

Nowadays, safe community tourism health building facilities with proper warehouse constructions, sport tourism as well as agricultural tourism facilities are becoming necessary due to climate change. Moreover, alternative types of tourism promoting green tourism facilities at old heritage buildings are needful for people as visitors from urban places at post COVID-19 pandemic era. Proper monitoring schemes due to climate change are necessary for safe heritage buildings supporting several events and landscape upgrade promoting environmental health and safe green tourism designs. In this way also educational tourism is promoted within interactive safe constructions at several alternative types of tourism within community health infrastructures [1-11].

Several cultural festivals, bazaars could take place so as to promote regional goods like local wines, olive oil, other natural nutritional virgin food and drinks products. Proper warehouses should exist so as to support the supply chain system between tourists and stakeholders. Due to climate change environmental health topics are becoming necessary so as to support safe building designs in fire protection and flood measures also supporting sustainability and clean technologies. Proper sustainable designs should take place so as to apply the right materials against fire events as well as taking right design measures, materials for corrosion in extreme flood events [12-27].

II. Sustainable Community Health Building Facilities Due To Climate Change - Fire Protection And Reclamation

Opportunities are coming for stakeholders and training services so as to support integrated community health tourism infrastructures at post COVID-19 era as well as due to climate change. Multilingual support web utilities should exist for tourists as well as for staff and stakeholders. Proper application of robust designs are necessary for safe community health building facilities due to particular natural hazards as well as monitoring schemes protecting land uses at heritage buildings within qualitative environmental health and safe green tourism designs [27-54].

Based on the literature useful products and design solutions are recommended for stakeholders as they are presented below [50-60]. The results should be combined with proper digital utilities like digital image processing, surveying

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manufactures, mapping tools, digital sanitary drawings within remediation, reclamation works applying proper project management in extreme weather conditions. Moreover, all the investigated materials should be applied properly at heritage buildings in case of earthquakes and extreme loads due to wind, flood, snow or other combinations. Hence, proper surveying works should exist in order to support any old structural members at old heritage building based on new structural design regulations for robust designs within particular construction facilities that should exist according to the operational necessities at community health infrastructures. Proper surveying applications for monitoring and upgrade in landscape should exist as well as 3d printer technologies for the production of useful innovative materials, remediation projects according to the necessities of the hotel facilities, stakeholders.

However, in the event of a fire, the following fire prevention aspects must be considered:

- Load-bearing structures fulfill the fire safety requirements for the period of time prescribed in the fire prevention technical regulations;
- The arising combustion products and smoke must be appropriately removed;
- Appropriate fire protection systems are installed to prevent the spread of fire;
- The reduction of the stability of the building structure under the influence of fire or other natural hazards.

Monitoring schemes considerations can also play an important role in the recovery works just after an elimination of the consequences of a possible fire. Hence, compliance with extreme emergency conditions must be repeatedly ensured in a cost-effective manner.

However, the load capacity at high temperatures based on the literature for the reinforced cross- section at several examining beams by adding carbon fire lamella as an alternative fire protection material presented satisfied results in terms of bending capacity about 50% increased [53]. For adding carbon fire lamella as an alternative fire protection material based on the literature it presented at time approximately 20 minutes of fire event the magnitude of MRd load capacity min / MRd found at 20 % for steel, 88 % for wood and also it was 94 % for reinforced concrete material respectively [53]. In addition to the above relative research based on the literature presented that for the reinforced cross-section at several examining beams by adding carbon fire lamella found that for 40 minutes of fire event the magnitude of MRd load capacity min / MRd was approximately 9 % for steel, 79 % for wood and 79 % for reinforced concrete material [53]. Other results could exist based on selected fire protection insulation materials or fire protection paintings so as to delay the fire damage due to fire event until the fire brigade will come so as to take the right measures.

In the same way based on the same research from the literature for one hour fire event the relative magnitudes found the magnitude of MRd load capacity min / MRd found at 8 % for steel, 55 % for reinforced concrete and 69 % for wood respectively [53]. The adding of carbon fire lamella for steel or wood present delay in fire event until fire brigade to come taking the right measures for the fire event as after the fire event replacement should take place for fired materials for a fire event with long duration [30-40, 53].

Moreover, several alternative materials can be used for small duration of fire events like foams, PLA for small scale constructions based on 3D printing manufactures and other combinations [53-56]. Proper chemical materials should be used like paintings, foams, gypsum with a width between 10 cm to 12 cm so as to delay the fire event and the fire brigade to take the right measures in time in less than one hour or more less, the produced smoke depends on the chemicals that are burned i.e painting materials for fire protection and others. Furthermore, almost non burned materials at low temperatures, it should be preferred so as to avoid smoke production quantities in particular fire events. Such materials could be stone wool. Unlike other types of insulation materials, stone wool is the only thermal insulation material that simultaneously provides thermal, acoustic and fire protection of buildings. Stone wool insulation ensures energy savings and the money that are invested in insulation will be returned within several years – which makes the return on investment for safe green tourism building facilities extraordinary. Proper state of the art technology from the market particular insulation manufactures within a wide range of top quality stone wool products for diverse building application could be used at walls, floors insulation as well as at roof top levels. Insulation stone wool is waterproof, vapour-permeable, and resistant to chemicals and microorganisms, durable, it does not enhance the growth of bacteria and moulds and it is recyclable. Major chemical compounds included in the composition of the mentione draw materials are oxides of silicon, aluminum, calcium, magnesium and iron. In accordance with formulations, the raw materials are added in a cupola furnace where they are melted at a temperature above 1400°C. In this raw material melting process, coke is used as an energy source. As an additional energy source, oil is used for the incineration of flue gasses. Through a mist of yarn, the fibers are blown into a collecting chamber and this is how primary felt of stone wool is obtained.

At old heritage buildings proper reinforcement should exist on properly fire protected materials for categories with good quality A1, A2 or rest ones like B according to building regulations on walls, floors in relation to fire protection taken measures for the stability of shear walls in terms of fire event and earthquake event in combination with other dynamic loads like methane explosion due to methane gas leakage from a renewable energy unit production of biogas from hybrid waste treatment units, proper reclamation projects should exist taking into account biogas methane leakage, flood events applying proper digital technologies [7-10]. For the protection of basement levels or roof top levels from extreme flood events proper sanitary drawing based on hydrological scenarios i.e for a flood event of 600 mm at base level proper thermal water proof insulation materials should exist in a height of 65 cm from ground level applying proper water proof mortars and drainage geotechnical materials with small hydraulic conductivity like clay or other ones, next to well designed stable water ways, canals in case of extreme flodd events. The above could be used as interactive events for tourists as well as for training staff at tourism units. However, monitoring schemes should exist in terms of biogas methane production that could exist nearby at a community health tourism facility so as to cover particular magnitudes in consumption of electricity and heating based on the building capacity of a methane production for renewable energy resources.

Furthermore, in case of discharge of pollutants in extreme weather events due to fires or heavy rains, trace heavy metals may exist on top soil. In that case proper clean technologies should take place as well as digested waste water sludge could exist so as to reduce the hazardous concentrations of heavy metals at any particular nearby land uses due to floods [50-55]. The metal concentrations in undigested sludge (mg/ kg) vary between 0 and 1800 mg / Kg while the metal concentrations in digested sludge vary between 0 and 3000 mg / Kg [57, 58]. For the latter circumstances useful sanitary digital drawings are presented at next section for monitoring schemes HACCP projects supporting health and safety protection public health and sustainable development.

The above are useful to be applied at renew projects of old heritage buildings applying renewable resources like electricity production and heating from biogas generated methane that could be upgraded to natural gas from dynamic waste water designs applying the methodology of sequential batch bioreactors units. In this way not only sustainability, but also green circular economy and new jobs are created for unemployed people.

III. Useful Digital Utilities For Training And Monitoring Schemes For Safe Green Community Health Tourism Facilities

Based on the above useful monitoring schemes for the safe operation of biogas production units promoting green tourism facilities and safe particular design solutions are recommended for stakeholders. The results could be combined with proper digital utilities like digital image processing, surveying manufactures, mapping tools, digital sanitary drawings for monitoring the proper remediation, reclamation works due to climate weather conditions. Proper multilingual support should exist for the trainers, interesting applications as attractions for tourists and stakeholders.

In figures 1,2 are presented useful applied policy for stakeholders as well as necessary monitoring schemes and maintenance works, reclamation projects that should exist periodically for indicative applied sanitary digital drawings and HACCP red bullets, monitoring schemes for maintenance projects, reclamation actions and safe green community health tourism facilities after extreme weather events i.e debris removal, renew proper paintings, indoors, outdoors, upgrade landscape.

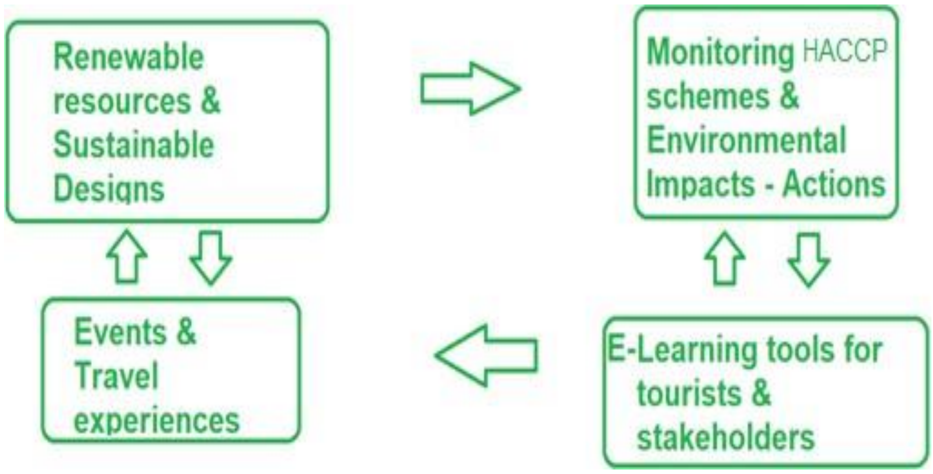

Figure 1. Qualitative environmental health policy for safe qualitative community health tourism building facilities applying proper monitoring schemes for reclamation, remediation projects.

Moreover, in figure 2 are presented indicative HACCP monitoring schemes for fire protection measures next to shear walls due to climate change at green health tourism heritage buildings and particular drainage works, training for reclamation and safe green tourism facilities corrosion protection measures applying proper water proof mortars and reclamation works with stable geotechnical materials.

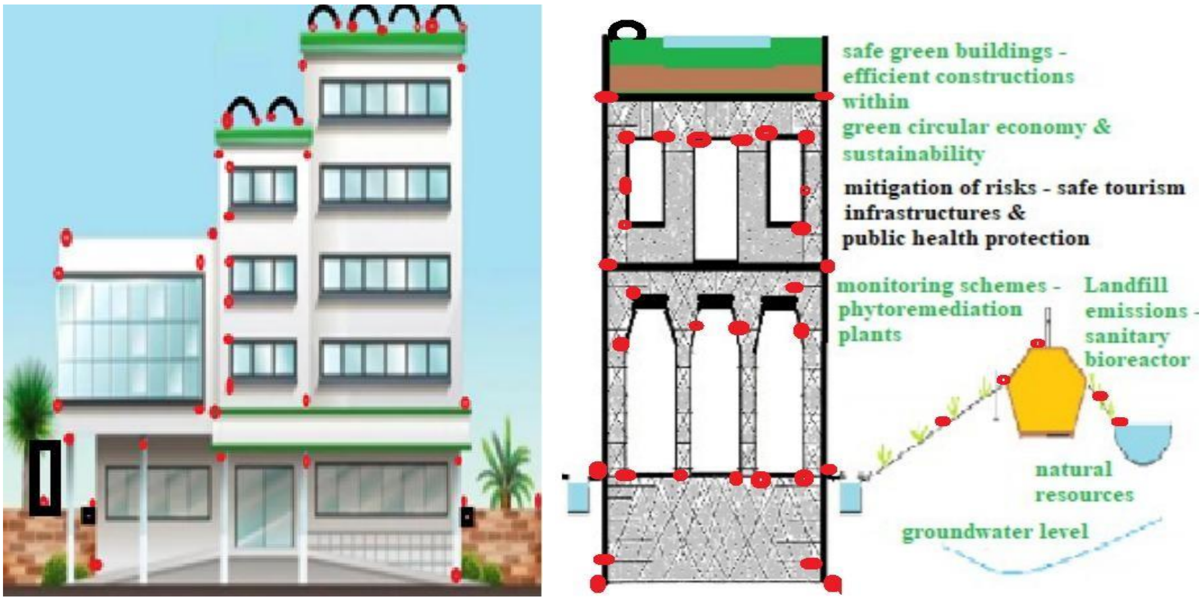

Figure 2. Indicative HACCP monitoring schemes for maintenance, reclamation and flood protection measures due to climate change at green health tourism facilities, heritage buildings.

The magnitudes of applied materials and design solutions, HACCP monitoring schemes vary on the necessities of particular projects. More health and safety projects will be applied in green tourism facilities in futures. Indicative the magnitude of thermal conductivity could be l = 0,45 W / (m . K) applying proper insulation brick wall material for indoor quality. However, for cold regional climates the magnitude for good building materials achieving a healthy indoor quality could be for outdoor wall thermal insulation U = 0,35 W/m^2*K, and for arid regional climates it could be U = 0,55 W/m^2*K, for semi arid ones it could be U = 0,45 W/m^2*K, according to European Union building regulations. Proper training should exist for the periodic maintenance of such projects especially after extreme weather events. The above results are useful for training staff, but also in terms of health and safety, and green design opportunities for stakeholders promoting green tourism facilities and green circular economy.

IV. Conclusions

Based on the above useful solutions in terms of health and safety, right project management and opportunities for training new technologies, materials to be applied and monitored by staff and collaborative stakeholders. Taking into account all the above new safe community health building facility could exist, upgrading the landscape and applying proper monitoring schemes. The magnitudes of the presented design solutions, HACCP monitoring schemes vary on the necessities of particular projects. More health and safety projects will be applied in green tourism facilities in futures. Proper training should exist for the periodic maintenance of such projects especially after extreme weather events. They could exist as an initial environmental health policy for qualitative safe green community health tourism facilities. Expansion of such technologies will exist in near future due to the combination of new materials and new designs based on economic robust designs covering the necessities of particular development projects for the sustainability and public health protection.

The above are necessary to be realized by stakeholders, supporting the right educational utility tools, supporting multilingual training portals. In this way not only tourists could understand the importance of green clean technologies at particular reclamation, remediation projects due to climate change but also could be applied the right designs, materials for safe heritage tourism buildings, green roof levels, safe green warehouse constructions, safe logistics units protecting environmental health. All the above should be taken into account at several development project for safe green tourism designs and protection of public health supporting designs that protect the environment and support green circular economy.

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