

**AN ENQUIRY INTO THE LEVEL OF AWARENESS OF THE USE OF
GEOSYNTHETICS AMONG CONSTRUCTION PRACTITIONERS IN THE
CONSTRUCTION INDUSTRY IN GHANA**

ABSTRACT

Whereas literature abounds on the comparative advantage the use of geosynthetics has over traditional alternatives to soil improvement, little is known of studies that ascertain the level of awareness of the use of geosynthetics among construction practitioners in Ghana. Thus this current study seeks to establish the level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana. This cross-sectional study employed a structured questionnaire in data collection. Data were analysed using frequencies, percentages, mean, standard deviation, and one sample t-test. It was revealed that there is generally a low level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana. An overall mean score of 2.377 was recorded which was less than the hypothesised mean of 3.5. Relatively, awareness level among construction practitioners regarding geopipes ranked 1st with a mean score of 4.057 whereas geofoms ranked 9th with a mean score of 1.796. Contrary to the view that geotextiles are the most known geosynthetics followed by geogrids, this study found out that in Ghana geopipes are the most known geosynthetics followed by geomembranes. Practically this study has established the level of awareness of the use of geosynthetics in the construction industry in Ghana, especially involving construction practitioners such as civil engineers, construction engineers, construction technologists and building technologists. Theoretically, it has provided the basis for future studies in geosynthetic use.

Keywords: Civil Engineering, Construction practitioners, Geosynthetics, and Ghana.

INTRODUCTION

Over the past decades, the use of geosynthetics has proven to be an environmentally friendly and more sustainable approach to improving the conditions of soils for civil engineering infrastructure compared with the traditional methods of improving soil conditions [1],[2]. Civil engineering infrastructures are the basic systems and facilities that help society to function and maintain the environment [3]. They include roads, railways, buildings, tunnels, canals, dams, ponds, manholes, pipes, earth retaining structures, wastewater treatment systems, landfills, water supply systems, breakwaters, airfields, and utilities, among others [3]. Geosynthetics are planar products produced from polymeric materials and used with rock, soil, earth, or other geotechnical engineering-related material as an integral part of a man-made structure, project, or system [4]. The production and use of geosynthetics contribute to the realization of the sustainable development goal **12: Responsible Consumption and Production**, which among others encourages companies, especially large and transnational companies, to adopt sustainable practices in the procurement of civil engineering infrastructure, reducing waste generation substantially through prevention, reduction, recycling, and reuse [5].

Geosynthetics are in nine major categories: geonets, geocomposite, geogrids, geomembrane, geosynthetic clay, geofoam, geopipes, geotextiles and geocells [6],[7]. Each category has a specific use for which it has been designed. However, they may be put into other use based on the designers' considerations. The use of geosynthetics includes filtration, separation, drainage, reinforcement, environmental protection, and provision of a fluid barrier[8],[9].

Geosynthetic studies in the past have focused on some aspects of geosynthetics such as the continental level of use of geosynthetics [9], challenges to the use of geosynthetics [10], use of geosynthetics in road construction[8], and comparative advantages the use of geosynthetics has over traditional alternatives to soil improvement [11]. Though studies in the past have also argued that globally, the low level of use of geosynthetics has a relationship with the awareness of the use of geosynthetics (see [10],[12],[6]), little is known of country-specific studies that establish the level of awareness of the use of geosynthetics for civil engineering infrastructure among construction practitioners. Moreso, none of the studies on geosynthetics has ever considered all the nine categories of geosynthetics in a single study. Thus, the relevance of this current study is that it seeks to establish the level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana. This study gives a more holistic view of the level of awareness of the use of geosynthetics among construction practitioners as it considered all the nine categories of geosynthetics in a single study.

The specific objectives that governed this study were:

- To establish the level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana;
- To determine the relative level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana.

Though this is a Ghana study and does not seek to generalize its findings to represent that of Africa or the globe due to the different dynamics and the composition of the construction industry across the globe. However, it offers lessons for countries, such as Nigeria, Burkina Faso, Angola, Malaysia, and South Africa; whose construction industry shares closely resemblances with Ghana. It also provides the basis for future comparative studies on the level of awareness of construction practitioners on the use of geosynthetics for civil engineering infrastructure with a focus on Ghana and countries across the globe. Moreso, in this study, construction practitioners encapsulate practising civil engineers, construction engineers, construction technologists, building technologists, and consultants who are responsible for the design, construction and or management of civil engineering infrastructure. Also, the use of geosynthetics defines the intended function(s) for which a geosynthetic was produced to serve in addition to other secondary functional use as specified by the designer or engineer (See [13]). Thus, in this study, the use of geosynthetics is synonymous with the functions of geosynthetics. Awareness on the other hand is the knowledge construction practitioners possess or have about the use of geosynthetics.

CATEGORIES AND USE OF GEOSYNTHETICS FOR CIVIL ENGINEERING INFRASTRUCTURE

Every geosynthetic is made to serve a primary use or function[12]. The primary use of geosynthetics is the intended or functional use for which geosynthetics were made to serve (See

[13]). However, beyond the primary use, existing studies also inform that there are other uses for geosynthetics (secondary or other use). For instance, according to [14] and [7], other use of geotextiles includes drainage, erosion control, and stabilization. According to [6], and [7], categories or types of geosynthetics include geotextiles, geonets, geogrids, geomembrane, geosynthetic clay, geofoam, geopipes, geocomposite, and geocells [6],[7].

Categories of geosynthetics:

Geotextiles

Geotextiles are permeable geosynthetic textile materials or fabrics used as an integral part of civil engineering infrastructure and are in contact with the soil, rock, earth, or any other geotechnical substance [4], [15],[16],[8]. Geotextiles were found to be among the most well-known geosynthetics in the UK, India, USA, and Nigeria respectively by [10], [17], [6] and [18]. The primary use of geotextiles includes separation, filtration, drainage, erosion control, stabilization, and reinforcement [14], [7]. Geotextiles function as reinforcement within a soil to improve the strength and deformation properties of the unreinforced soil. They also function as a drain in soil, allowing fluid to flow through less permeable soils. Moreover, when geotextiles are used as a sand filter, they allow liquid to move through the soil and retain upstream soil particles. Geotextiles also function as a separator when used to separate layers of the soil of different grades [14].

Geogrids

Geogrids are polymeric materials made by weaving, extrusion, or welding to form an opening aperture product of varying strain, strength, and load-carrying capability for soil reinforcement use [7]. [18] and [6] argued that geogrids are the second most known geosynthetics. Geogrids are manufactured primarily as a reinforcement or stabilizer material in addition to providing separation between soil and aggregate layers [8]. Geogrids could be used in the reinforcement of soils for steep slopes, walls, roadway and railway bases, and foundation soils, among others. They are also used for the stabilization of soils with low bearing strength or high-water table [7].

Geomembranes

Geomembranes are low-permeability or impermeable geosynthetic materials, used as an integral part of civil engineering infrastructure to reduce or prevent the flow of fluid through the soil. They are commonly used as cut-offs and liners. Geomembranes are also used as hydraulic barriers (an example is when used as canal lining), field seaming, and minimization of installation damage [8]. Geomembranes are also used in combination with other geosynthetics as geocomposites for civil engineering infrastructure for enhanced effects [14]. An example is a geotextile-geomembrane geocomposite for civil engineering infrastructure such as waste landfills. The combination improves the protection function of geomembranes as water barriers in waste landfill systems and avoids also frictional instability [14].

Geonets

Geonets or Geospacers are polymeric structures formed by a set of continuous parallel polymeric ribs at acute angles to one another, forming a net-like pattern [8],[7]. In cases where chemical resistance is envisaged, geonets made from polyethylene and polypropylene polymers are highly recommendable. They are used for in-plane drainage of gases or liquids (especially leachates from landfill and mining projects) and filtration of sediments contained within these fluids. Geonets are frequently laminated with geotextiles on one or both surfaces and are then referred to as drainage geocomposites [4],[1].

Geofoam

Geofoam is a closed-cell, super-lightweight, rigid, plastic foam. It is an extruded polystyrene (XPS) or expanded polystyrene (EPS) which is manufactured into large lightweight blocks. Geofoam is used to reduce settlement below embankments, provide sound and vibration damping, reduce lateral pressure on sub-structures, and reduce stresses on rigid buried conduits and related applications [19],[9]. Primarily, geofoam provides a lightweight fill below a highway, bridge approach, bridge abutment, flood control levees, basement insulations, railways, embankment, and parking lot. It also serves as new fills in culverts and pipelines to reduce the load over the base structure [19],[9].

Geocells

Geocells are three-dimensional geosynthetic cellular structures made with novel polymeric alloy (NPA) or ultrasonically welded high-density polyethylene (HDPE) strips [1], [20],[19], [21].. Geocells are expanded on-site to form a honeycomb-like structure which is then filled with soil, gravel, rock, or concrete. Geocells are also known as Cellular Confinement Systems (CCS). They are used for soil stabilization on flat ground and steep slopes, channel protection, erosion control, road construction, landfills, landscaping, mining operations, structural reinforcement for load support and earth retention, protective linings for channels and hydraulic structures, provide support for static and dynamic loads on weak subgrade soils, and green infrastructure projects [1],[21].

Geosynthetic clay liners

Geosynthetic clay liners consist of thin layers of bentonite clay sandwiched between two layers of geotextiles and bonded to a geomembrane [7]. Geosynthetic clay liners are used as hydraulic barriers for leachate, water, other liquids and even gases. Geosynthetic clay liners are also used as a substitute for either compacted clay liners or geomembranes. They are also used in a composite manner to further improve traditional liner materials [7].

Geopipes

Geopipes are solid-wall or perforated polymeric pipes for the drainage of fluid (gases and liquids). They are primarily used for leachate collection and in instances of high compressive loads [7]. Geopipes are preferred for landfill use as a means for the collection and quick drainage of the leachate to a sump, and removal system [7].

Geocomposites

Geocomposites are geosynthetics formed by a mixture of two or more geosynthetics such as geomembrane-geonet, geonet-geotextile, and geogrid-geotextile, among others [9]. The geosynthetic clay liner is an example of geocomposites [9]. Primary uses of geocomposites include separation, reinforcement, drainage, filtration, stabilization, containment, and erosion control [22].

Use of geosynthetics

Regarding the use of geosynthetics, several views have been expressed in previous studies (see [8], [9]). The use could be primary (the intended use or function for which the geosynthetic product was manufactured or designed) or secondary (other use apart from the intended use for which the geosynthetic product was designed). In literature, the use of geosynthetics has been predominantly discussed under reinforcement, stabilization, erosion control, filtration, fill material, containment, drainage, and separation use (see [8],[9]).

Containment

When geosynthetics are used as containment, they serve as barriers to fluid, landfill liners and covers, and general hydraulic applications including dams, tunnels, surface impoundments and canals (liquid or/and gases) [23],[9]. The category of geosynthetics used as containment are geomembranes, geosynthetic clay liners and some geocomposites [22],[9]. When Geosynthetic clay liners are used for hydraulic projects they provide a hydraulic barrier for water, leachate, or other liquids and even gases when it gets into contact with the fluid. They are also used in highway construction, landfill construction, mining projects, and in canals as secondary containment [7]. Geomembranes aid in the prevention of contaminant diffusion in waste management [7]. Geomembranes serve as a hydraulic barrier in ponds, transportation, tunnel, canal lining, environmental, and oil and gas applications [7].

Fill material

The category of geosynthetics used as fill material is the geofoam. When used as a fill material, geofoams reduce lateral pressures on retaining walls and stresses on underlying soils, abutments, or foundations [7].

Soil erosion control

Category of geosynthetics used for erosion control include geotextiles, geonets, geocells, geomembranes, and some geocomposites [9]. Geonets are used in foundation walls, landfills, and roads for erosion control [7]. Geocells are used for erosion control on steep slopes and offer protection to channels [7].

Soil Stabilization

Categories of geosynthetics used for soil stabilization include geotextiles, geogrids, geocells, geonets and some geocomposites. Geotextiles are used in ensuring stability during saturation in the rainy season and conditions of sudden drawdown [9]. Geonets are used as stabilizers in foundation walls, landfills, and roads, asphalt concrete pavements [7]. Geocells are used for soil stabilization on steep slopes and flat grounds. Geogrids are used to stabilize the subgrade for the construction of embankments in railways and highways. Geogrids offer soil stabilization in areas with high water table levels or low bearing strength where laying of foundations to carry heavy loads is critical [2],[7].

Drainage

Geosynthetics for drainage purposes allow liquid to flow through it without losing the soil. Categories of geosynthetics for drainage purposes include geopipes, geotextiles, geocells, geonets and some geocomposites [22],[9]. Geonets are used to convey all types of fluids. Geopipes are used to collect and drain leachates from landfill sites [7]. When geocells are used in highway construction, they aid in fixing water accumulation problems and the soil erosion problem that may arise [7].

Filtration

Categories of geosynthetics for filtration purposes include geonets, geotextiles, and some geocomposites [22],[9]. Geonets serve as filter media and prevent surrounding fills from clogging drainages [7].

Separation

Categories of geosynthetics used for separation include **Geonets**, geocells, geotextiles, geofoams, and some geocomposites[7]. According to[9], separation is a primary function of geofoams and geocells use.

Reinforcement

Categories of geosynthetics used as reinforcement include geonets, geogrid, geotextiles, geocells and some geocomposites[22]. These geosynthetics are good in tension and thus complement the soil which is good in compressing to serve its structural purposes when used as an integral part of civil engineering infrastructure[7]. Geocells offer structural reinforcement for earth retention and load support when used for earth retaining structures[7]. Geogrids are normally used to reinforce the sub-bases of roads, as well as retaining walls or other structures such as dams due to their ability to redistribute load over a wider area, their high tensile strength, and their high holding capacity[7].

METHODOLOGY

This cross-sectional study, because data collected pertains to only what prevailed within the period of data collection thus time bound, employed a two-stage approach to research. Firstly, literature was reviewed which aided in identifying the use of geosynthetics for civil engineering infrastructure. The second stage was the use of a structured questionnaire to solicit the views of construction practitioners on the use of geosynthetics for civil engineering infrastructure. The respondents included construction practitioners from 257 construction firms who belong to the Association of Building and Civil Engineering Contractors of Ghana (ABCECG). This sample size of construction firms was determined based on [24] principle that, for a population of size around 1500, 20% should be sampled (see [24],[25]). Thus, 20% of the population of 1282 construction firms registered with ABCECG is equivalent to 257 construction firms. The population size was obtained from the ABCECG secretariate and [26]. ABCECG was chosen as the study population because it is the association for building and civil engineering contractors (construction firms) in Ghana with members in all regions of Ghana. In each firm, information was solicited from construction practitioners within the field of civil engineering, construction engineering, construction technology, or building technology who have experienced the use of geosynthetics. In addition, the views of five (5) construction industry consultants were purposively added. Within each consulting firm, information was solicited from practitioners within the field of civil engineering, construction engineering, construction technology, or building technology who have experienced the use of geosynthetics. Thus, the views of 262 construction practitioners were sought regarding the use of geosynthetics for civil engineering infrastructure. In this study, construction practitioners embodied construction practitioners with both consultants and contractors (construction firms).

In establishing the level of awareness of the use of geosynthetics among construction practitioners, 32 statements regarding the use of geosynthetics for civil engineering infrastructure were presented to the construction practitioners. They were required to indicate the extent to which they agree with the statements based on their knowledge and experience using a 5-point scale, where (1) represents strongly disagree, (2) is disagree, (3) is neutral, (4) is agree, and (5) denotes strongly agree based on their experience and/or knowledge.

A 100% response rate was recorded because the questionnaire was self-administered with the help of twenty (20) field workers from June 2022 to August, 2022. Respondents spent at most 8 minutes on the survey, and further clarification was given when requested. Data were analysed using the standard deviation and the mean. Data were further analysed using one sample t-test. This aid in comparing the mean value of the respondents to the population/hypothesized mean to establish the level of statistical significance of the responses obtained from the research respondents. Accordingly, a hypothesized mean was set at 3.5 (see [27]). The significance level was also set at 95% in accordance with predictable risk levels (see [27]). Any significant (1-tailed) value (p-value) not exceeding 0.05 was considered statistically significant (see [27]).

RESULTS AND DISCUSSIONS

Table 1. Respondents' demographic characteristics

Main variables	Specific variables	Frequency(N)	Percentage (%)
Job role of respondents	Civil engineer	112	42.75
	Construction Technologist	35	13.36
	Building Technologist	85	32.44
	Construction Engineer	25	9.54
	Consultant	5	1.91
	Total	262	100
Working experience in Ghana	5 years	40	15.27
	6 to 10 years	43	16.41
	11 to 15 years	42	16.03
	16 to 20 years	79	30.15
	Above 20 years	58	22.14
	Total	262	100
Gender	Male	247	94.27
	Female	15	5.73
	Total	257	100

The demographic characteristics of the respondents suggest a great level of work experience. This is an indication that the research respondents were well informed and experience will be brought to bear in response to the questions on the questionnaire. The percentage of male and female respondents only reflects that the construction industry in Ghana is a male-dominated sector and there is a need to cautiously bridge the male-female ratio in construction programmes.

Table 2a: level of awareness of the use of geosynthetics among construction practitioners

Use of geosynthetics	Mean	Mean score ranking	Standard deviation	Sig(1-tailed)	Statistical significance

Geotextiles	2.770				
Geotextiles are used for soil separation	4.2061	1 st	0.65761	0.000	Yes
Geotextiles can be used for soil filtration	3.7328	2 nd	0.79099	0.000	Yes
Geotextiles serves as a reinforcement to soils	2.1031	3 rd	0.73296	0.000	Yes
Geotextiles are useful for soil drainage	2.2824	4 th	0.57101	0.000	Yes
Geotextiles can be used as soil stabilizers	2.3321	5 th	0.58758	0.000	Yes
Geotextiles functions as a filter media	2.4618	6 th	0.71951	0.000	Yes
Geotextiles are useful for erosion control	2.2748	7 th	0.55438	0.000	Yes
Geomembranes	3.105				
Geomembranes function as containment to prevent ground pollution	3.9198	1 st	0.77637	0.000	Yes
Geomembranes are useful for erosion control	2.2901	2 nd	0.56715	0.000	Yes
Geogrids	2.185			5 th	
Geogrids serve are reinforcement to soils	2.6641	1 st	1.01037	0.000	Yes
Geogrids serve as soil stabilizers	1.7061	2 nd	0.72812	0.000	Yes

Table 2b:level of awareness of the use of geosynthetics among construction practitioners

Use of geosynthetics	Mean	Mean score ranking	Standard deviation	Significant (1-tailed test)	Remarks Significant (1-tailed test)
Geonets	1.957				
Geonets could function as a filter media	2.0878	1 st	0.85541	0.000	Yes
Geonets are useful for erosion control	1.9542	2 nd	0.85646	0.000	Yes
Geonets serve drainage purposes in soil	1.9084	3 rd	0.96649	0.000	Yes
Geonets function as soil stabilizers	1.8779	4 th	1.03962	0.000	Yes
Geofoams	1.796				
Geofoams serve as fill material	1.8206	1 st	0.98372	0.000	Yes
Geofoams are used for soil separation	1.7710	2 nd	1.00241	0.000	Yes

Geosynthetic clay liners	1.897				
Geosynthetic clay liners serve as containment of fluid to prevent ground pollution	1.8969	1 st	1.04353	0.000	Yes

Table 2c: level of awareness of the use of geosynthetics among construction practitioners

Use of geosynthetics	Mean	Mean score ranking	Standard deviation	Significant (1-tailed test)	Remarks Significant (1-tailed test)
Geocells	1.816				
Geocells separate soils	2.1832	1 st	1.08491	0.000	Yes
Geocells stabilizes soils	1.8092	2 nd	0.87638	0.000	Yes
Geocells reinforce soil	1.7557	3 rd	0.99879	0.000	Yes
Geocells are useful for erosion control	1.5153	4 th	0.72036	0.000	Yes
Geocomposites	1.809				
Geocomposites are useful for soil separation	2.0382	1 st	0.90469	0.000	Yes
Geocomposites are useful for soil stabilization	2.1374	2 nd	1.14312	0.000	Yes
Geocomposites are useful for soil reinforcement	1.9427	3 rd	1.10752	0.000	Yes
Geocomposites are useful for fluid containment	1.8931	4 th	0.97676	0.000	Yes
Geocomposites serve as filtration media	1.8702	5 th	1.03869	0.000	Yes
Geocomposites are useful for soil drainage	1.7176	6 th	0.82374	0.000	Yes
Geocomposites	1.5878	7 th	0.67660	0.000	Yes

are useful fill materials					
Geocomposites are useful for erosion control	1.2863	8 th	0.45288	0.000	Yes
Geopipes	4.057				
Geopipes are useful for soil drainage	4.0573	1 st	0.67846	0.000	Yes

From Tables 2a,2b, and 2c, standard deviation values were largely below one (1.0). This is an indication that there was consistency in the data collected from the research respondents and there is little variability in the views they expressed. Thus, responses were reliable and accurate. Moreover, all the p-value for the one-tailed test from Tables 2a,2b, and 2c, indicate a strong statistical significance of the data collected. All, the t-test p-values were 0.000.

Table 3: Mean score ranking of the level of awareness of the use of geosynthetics among construction practitioners

Geosynthetic(s)	Mean score	Ranking
Geopipes	4.057	1 st
Geomembranes	3.105	2 nd
Geotextiles	2.770	3 rd
Geogrids	2.185	4 th
Geonets	1.957	5 th
Geosynthetic clay liners	1.897	6 th
Geocells	1.816	7 th
Geocomposites	1.809	8 th
Geofoams	1.796	9 th
Overall mean score	2.377	

Table 3 presents the outcome of the level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana based on their knowledge and experience. It was revealed that there is generally a low level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana. An overall mean score of 2.377 was recorded which was less than the hypothesised/population mean of 3.5. Specifically, the results indicate that apart from geopipes that recorded a mean score of 4.057, all the other categories of geosynthetics recorded mean scores that were lower than the population/hypothesised mean of 3.5. This is an indication that there is generally a low level of awareness regarding the use of geosynthetics among construction practitioners in Ghana. This confirms the argument by [10], [12], [18] and [6] that there is a generally low level of awareness among civil engineering practitioners with regard to the use of geosynthetics. However, this current study in Ghana has further revealed that a low level of awareness exists among construction practitioners including civil engineering practitioners. Thus, the approach to addressing this low level of awareness of the use of geosynthetics should look beyond civil engineering practitioners. It should be centred on construction practitioners. Furthermore, this study unravels that relatively, the use of geopipes ranked 1st with a mean score of 4.057. This was

followed by geomembranes with a mean score of 3.105. The third (3rd) was geotextiles with a mean score of 2.770. Geopipes being ranked 1st contrasts the view of [10], [12] and [18] that geomembranes and geotextiles are the most known and used geosynthetics. This implies that the level of awareness of geosynthetics among construction practitioners differs from one country to another. Hence, Ghana's case contrasts that of the UK, Nigeria, and the USA as revealed by [10], [18] and [6] respectively. Moreover, geogrids with a mean score of 2.185 ranked 4th. This revelation contrasts with the opinion by [18] and [6] that geogrids are the second most well-known geosynthetics used for civil engineering infrastructure. Moreover, Geonets with a mean score of 1.957 ranked 5th, followed by Geosynthetic clay liners with a mean score of 1.897 and ranked 6th whereas Geocells, Geocomposites, and geofoams ranked 7th, 8th and 9th respectively having recorded respective mean scores of 1.816, 1.809 and 1.796. Thus, geofoams were the least known geosynthetics among construction practitioners in Ghana.

CONCLUSIONS

This current study seeks to establish the level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana. The study concludes that there is generally a low level of awareness of the use of geosynthetics among construction practitioners in the construction industry in Ghana. Awareness level among construction practitioners regarding geopipes ranked 1st with a mean score of 4.057 whereas geofoams ranked 9th with a mean score of 1.796. Contrary to the view being held in previous studies that geotextiles are the most known geosynthetics followed by geogrids, this study found out that in Ghana geopipes are the most known geosynthetics followed by geomembranes. This affirms the argument that the level of use of geosynthetics is industry or country-specific. This study has empirically made known that the low level of awareness of the use of geosynthetics is not peculiar to civil engineering practitioners but to construction practitioners like construction engineers, construction technologists, and building technologists. Thus, approaches aimed at addressing this low level of awareness of the use of geosynthetics should include all construction practitioners in the construction industry in Ghana. The findings of this study have the tendency of informing policymakers in policy-making relating to the use of geosynthetics. Practically it has established the level of awareness of the use of geosynthetics in the construction industry in Ghana especially when it involves construction practitioners such as civil engineers, construction engineers, construction technologists and building technologists. Again, the study contributes to the existing literature on geosynthetics usage and serves as the basis for future studies on the use of geosynthetics.

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