



Construction and Engineering Structures

Vol: 1(1), 2022

REST Publisher; ISBN: 978-81-956353-3-7

Website: <http://restpublisher.com/book-series/ces/>

Fundamentals of building Construction Materials Using the WASPAS Method

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Abstract: construction material is for construction material used. Clay, rocks, sand, wood, and branches naturally leave buildings with many materials that occur used for construction. Naturally occurring substances, many are man-made products are in use, some more and some less artificial. As jio products, building materials called from a variety of settings are quarried and mined. To discover new resources because the pressure is increasing the world's growing population and pressure to hold increases. Adobe bricks stone and clay are from ancient times and were the major building materials of the world, and concrete is long and venerable history. These items are still in demand, and any other quarry for their kinds of extractive industry same environment as same creates problems. Research significance: this is a list of building materials. Buildings and structures many in the construction industry create kinds of building materials that are used. Construction is used for projects to specify materials and methods, architects and construction in this category by project manager's materials and products are used. Cold such as rolled steel framing some building materials, blockwork, and traditionally wood modern rather than slow methods are considered as methods of construction. Many different building materials applications include; therefore, a product for your needs whether it is most suitable consult the manufacturer to verify always well. WASPAS method weighted sum model (WSM) and weighted product model wpm use benefits. Integrating wsm and wpm, ranking of waspas alternatives increases accuracy. That at this stage, waspas is an optimum calculates the additive parameter, which will be given in detail later. The waspas method of analysis is excellent and the best solution. Short distance and negative-best are more than the solution the long-range solution determines, but a comparison of these distances is not considered environmental design and performance, environmental product declarations, harmonized technical specifications, efficient manufacturing of construction materials, governmental support to enterprises. Evaluation preference taken as USA, UK, Australia, Japan. from the result, it is seen that efficient manufacturing of construction materials got the first rank whereas environmental product declarations is having the lowest rank..Conclusion: since environmental production announcements have a very low position, the efficient production of construction materials is obtained by the first ranking.

Keywords: Construction Materials, WASPAS, building environmental design, governmental support to enterprises.

1. Introduction

Almost all building constructions at least some during construction kinds of earthworks. On undeveloped sites, trees and plants, stumps, large roots, and other surface materials removed by heavy machinery, sweeping and cleaning construction can begin with next, at the end of construction to wait for reuse, organically enriched topsoil is cleared, can be stored on one page. The construction site will be covered by the building if more than the area is sufficient, and excavation edges lean back or lower can be benched at an angle, this prevents the soil from going back into the hole [1]. This handbook, in the construction industry except for wood, but cement, concrete, gypsum, organic construction materials, adhesives, and paints a wide variety of products including includes thermal analyses. Each building material data is used for classification, tg, tma, dma, dea, and trafficking different types like calorimetry thermal analyzes and they are brief about the activities in the first chapter for explanations after dedication [2]. Non-metallic minerals construction with focus flows of goods and on the collective study of existence, thirty-one scientific publications are reviewed. These surveys are for different purposes serve: future input and forecasting output flows and compare, many in the future run studying the influence of parameters, current or future stock and assessing its evolution, study of urban metabolism for making and

flows and shares analyze the interactions between doing they are national and regional or carried out at the urban level and their duration is a century to a year [3]. For thousands of years, clay building materials and as an integral part of the goods widely used. Important structural clay product examples are bricks, blocks, and roof tiles. Floor and wall tiles are clay non-structural made examples of items. Made of clay material buildings is the development of civilization predating the early period. Concrete, fiberglass, etc although modern materials are available, clay is preferred for related products properties, durability, strength, heat, and sound insulation, and fire prevention is different and more substantial in fields there is a need for [4]. Population especially in the last decade due to increasing construction and the chronic shortage of goods cause, construction material a great demand is placed on the field. Rising housing demand for filling, brick, cement, aggregates, steel, aluminum, wood, cladding, and partitioning materials of construction materials such as there is an exponential demand for production. Like cement, brick, and steel conventional building materials production is high heat and electricity consumer's energy and pollutes air, water, and land. Suitable construction materials adequate care in use not paid. Agriculture and in industrial production activities solid waste generated from removal will develop like India another serious problem in countries [5]. Pcms are the energy of building components in addition to affecting efficiency, they are some of the building material's mechanical and durable features that can improve. For example, in the cement hydration process when the mass of concrete elements temperature variations in concrete and improving thermal evolution, of concrete in the presence of pcs heat shrinkage, crack resistance and researchers also studied thermal contraction investigated. Including pcs frost on concrete pavements' thawing cycles or temperature bends i.e. Curling pressures due to heat stress and damage reduction has also been studied [6]. These natural fibers are cement paste, mortar, and/or in mixtures such as concrete as a construction material used by different researchers examined. Various studies carried out the results are presented briefly. The purpose of this review is to the last few various estimated decades available in natural fibers it is a collection of data, therefore, the upcoming of a particular thread as a reference/guide for research can be used. Of compounds to increase strength properties natural fibers are used [7]. Relative energy and carbon (dioxide) open access to emissions, and the development of a reliable database as described. Bat university's carbon and energy database the list is almost 200 different list items. Defined times and based on five criteria from fellow reviewed literature the data was extracted. Database through online websites available in public and industrial, education, government fields, and agencies remarkable has been attracted to interest [8]. Environmental management standards une-eniso 14040 and une-eniso 14044 since published in 2006, a large number of LCA databases have been created. Construction ecosystem in the study of impact can be used in several databases however, these studies are when reviewing, lca locations of the database and to places where the study was conducted inappropriateness in between, lack of transparency and/or building project data is not in matching for conditions there are many important problems such as [9]. Various research for decades to transform in the building setting in plans coordinating items (PCM) heat of lightweight buildings by the idea of improving the facility. Most of these efforts. Macro-capsules or direct using sinking processes, both provide many disorders. Because of these problems, these pcm products are wide and did not win in the market [10]. Construction International labor and information about labor have been identified as a profession. Among the project participants daily this of data and information is the mainstream of the rigorous exchange of one of the construction processes the feature. Thus, in the last two decades, real-time information settings construction plans as an important tool in managing have changed. Technologies in terms of the availability up, to the construction of multiple advanced technologies, are very useful. Their accuracy, credibility, and honesty are improved come, but at the same time, their costs are constantly declining [11]. Highway structures are usually from two construction materials are constructed: stainless steel concrete and configuration steel. Both products are decaying in ways, and more of them created bridges and bridge structures need to be reorganized or positioned to be replaced to get worse. These bridges are to reorganize or to them bring new ones the cost is shocking, approximately \$ 90 billion per year. Diminishing state and central highway funds, new items, and finding the designs for transport companies put pressure on, they are low to construct bridges at cost and last long [12]. Cement and slag particles are usually spherical, the larger, tens of thousands of brittle particles required in the order of microns by grinding the particle size are created. So, flying gray Portland a flow in cement concrete widely included; spherical shaped, new cement pastel viscosity and yield to reduce the pressure, deposited for reasons including consequences operates. 60% angular (cement) settlement with particles and 40% water this is usually in concrete more water than used / cement is proportion when it is cut in the interconnected combination of particles let's meet problems [13]. Building and construction (b&c) occupation is one of the main business drivers, however in recent years the lack of skilled labor, automation, and security due to the problems, for the target less construction time, lower pollution and waste it is difficult to fill. In this regard, 3d printing (3dp) is the formwork and human intervention of the complex 3 dimensions (3d) without structural looks like a trusted technology [14]. Portland blocks of cement inspection in infrared research in the first decade. Portland the main cement in the current compounds of the compounds was at the forefront of the study but later, calcium aluminate carbonation of cement and some research on processes were carried out. Also, portland cement and its component's hydration were created. After that early period, cement products by infrared many statements in the study of has been done. Calcium aluminates the latest related to cement studies have been reported. Then, in different documents, some of the qualities of objects have been presented and in infrared the spectrum is mainly the art and with sem analysis tools as a filling subtitle to attach multiple exposure levels using they gave evolution on [15].

2. Materials & Methods

Alternative: Building environmental design and performance, Environmental product declarations, Harmonized technical specifications, Efficient manufacturing of construction materials, Governmental support to enterprises.

Evaluation Preference: USA, UK, Australia, Japan

Building environmental design and performance: In the standard design environment minimizing negative impacts seeks, more building residents' health and comfort, it is the performance of the building improves. Consistency's basic purposes, are to update consumption reduction and healthy, productive creating environment. Environment performance is a building or project or product or the environment of the process impact, production, and use and occurs during the removal environmental a combination of factors.

Environmental product declarations: Environmental product declaration (EPD) the report, the object of an object the story of the life cycle is single, says in a detailed statement. The possibility of global warming, smoke creation, ozone decay, and the environment like water pollution impact epd provides information.

Harmonized technical specifications: Compatible standards european union law appropriate or is considered adequately install technical specifications. In most cases, compatibility with the use of standards is voluntary.

Efficient manufacturing of construction materials: The subject's performance means impacts associated with consumption aim to reduce. Some technical strategies, already durability increasing, completely use, to avoid waste reusing the components or lightweight product design by reducing also includes.

Governmental support to enterprises: Including growth and investment, any legitimate business funds can also be used for the purpose. In lending to businesses confidence continue in order to ensure holding, for the lender's 80% of funds the government is guaranteed. Economic policy development, business development support, and imposing controls and relaxing to the entrepreneur governments help.

3. WASPAS (Weighted Aggregated Sum Product Assessment)

In the WASPAS method, two for optimality a composite scale based on criteria searched for. The first criterion of optimality, viz the weighted average success criterion is the WSM method like it is a famous and well the adopted MCDM approach is several based on decision criteria used to evaluate alternatives. Weighted aggregate product assessment (WASPAS) the methodology consists of eight manufacturing decision-making problems as a useful MCDM tool when solving are investigated, Cutting fluid, electroplating system, forging stage, arc welding process, industrial robot, grinding stage, materials machinability. All exams considered difficulties and disabilities accurately this method has sorting capability. WASPAS effect of λ parameter on ranking performance the method is also investigated [16]. The WASPAS method is a technique, it changed into progressed by using which this method in many decision problems and contexts used and extended. Bagosius et al. (2013) based on the WASPAS method a multi-criteria incorporated selection-making procedure select the best version construction net page for deep water port. Advanced an MCDM technique on a reconstructed vernacular constructing the use of AHP address the issue of daylighting and traditional continuity. Hashemkhanisolfani et al. (2013) SWARA hierarchical weight estimation ratio analysis and WASPAS methods using multiple to solve the shopping mall location problem criterion developed approach to decision making. Javadskas et al. (2013a) WASPAS and moora multi-objective based on ratio analysis validates the robustness of optimization methods. Javadskas et al. (2013b) some public and commercial to evaluate facades of buildings WASPAS method was used [17]. Weighted discussed in recent years' total product assessment (WASPAS) and ambiguous extensions. The new MCDM will determine the utility approach is weighted total product evaluation (WASPAS) is called. In WASPAS 2012 recommended for the first time and it is strong in deterministic approaches to new MCDM application is one. This approach is a weighted one product version (WPM) and weighted sum model (WSM) is zavadskas, turskis, proposed and the argued combination. The accuracy of this approach stronger than wpm and WSM [18]. WASPAS formal, ordered fuzzy using numbers (OFNS), which is proposed by zadeh an extension of ambiguity set approach. The concept of OFNS is introduced. Ambiguous as opposed to numbers, arithmetic in this model functions functions of real numbers as such, they a unique case of OFNS. WASPAS approach through zavadskas, turskis, antuceviciene was created. WASPAS method accuracy is a weighted amount rather than used method or weighted ones recommended product model that it is favorable. Current literature, to consider OFNS in ambiguous WASPAS mode failed and one of the methods mentioned above the concept lacks unifying research [19]. Weighted aggregate product assessment (WASPAS) systematic, downside risks to the project used to assess outcomes. Change compared to independent methods of ranking this method is efficient and highly accurate. WASPAS methodology in new multi-index decision making techniques one, it is accepted in many areas is used. In this research, road in iran we identify the risks of the construction project we evaluated, the results of which, access to baroque pits infeasible/irrelevant, during the project life cycle loss of key manpower, inexperienced support hiring contractors among the identified risks are the most important risks [20]. Weighted aggregate product assessment (WASPAS), time usage choice of attendance software including the problem is integrated. Critic approach is a goal for figuring out scale weights methodology, which include depth of version and choice-making a contradiction within the structure of the hassle is protected. It belongs to the elegance of conversation methods and alternatives information at the standards to be assessed primarily based totally on

WASPAS the method is weighted sum version (WSM) and of weighted product model (WPM). Mixing, and it's full of alternatives used to rank. Kritik and WASPAS a new based on combination of methods applicability decision making approach of this article to the literature the main contribution is proof [21]. Healthcare outsourcing for 15 different strategies have been developed. QSPM tool and several standards decision making device WASPAS method integrating an integrated approach to evaluate the strategic options used recommended. Top five best ranking strategic options are QSPM and WASPAS be mindful of using approaches want also, a strong, math-based as the WASPAS method was used, the result was accurate can also be considered reliable [22]. One based on the WASPAS approach the new method was developed with HFS. Experts and various information to calculate scale weights actions are proposed. Changes to the WASPAS technique, HF-operators and scalar weight estimation procedure is carried out. For the inexperienced dealer selection problem the generated method is executed. With HFSS WASPAS method for estimating MCDM problems and an integrated based on information activities [23]. WASPAS the technique is very realistic and the rating is correct strongly attracts the idea of WASPAS approach weighted sum model (WSM) and weighted product model (WPM) uses advantages. WSM and wpm in addition, the rating accuracy of WASPAS options will increase. At that factor, WASPAS is an highest quality mixture calculates the parameter, that is distinctive later may be given. Many of the WASPAS systems were successful despite the applications (mardani et al., 2017), most published works rank ignore the concept of precision, and WSM and composition parameter of wpm on temporal basis is determined. Wafeipour et al. (2014) priority areas for implementation of solar energy projects [24]. Current research examines the effectiveness of TSPS intuitive fuzzy weighted aggregate for comparison uses product assessment (if-WASPAS) technique. The proposed method IFSS operators based on more scaled weights a new method of calculating scale weights to calculate, to arrive at more reasonable weights objectivity derived from similarity measure method results with weights expressed by experts we aggregate the subjective weights. Objective new unity for IFSS to calculate weights actions are developed and proposed a variety of harmony activities are elegant demonstrates characteristics [25].

4. Result and Discussion

TABLE 1. Construction Materials

	USA	UK	Australia	Japan
Building environmental design and performance	31.08000	139.53000	29.15000	22.05000
Environmental product declarations	29.12000	142.97000	33.69000	27.30000
Harmonized technical specifications	24.08000	122.58000	29.18000	23.10000
Efficient manufacturing of construction materials	23.17000	128.28000	24.60000	17.59000
Governmental support to enterprises	33.33000	186.41000	27.96000	18.89000

Table 1 shows the Construction Materials Alternative: Building environmental design and performance, Environmental product declarations, harmonized technical specifications, Efficient manufacturing of construction materials, Governmental support to enterprises Evaluation Preference: USA, UK, Australia, Japan to calculate the final value.

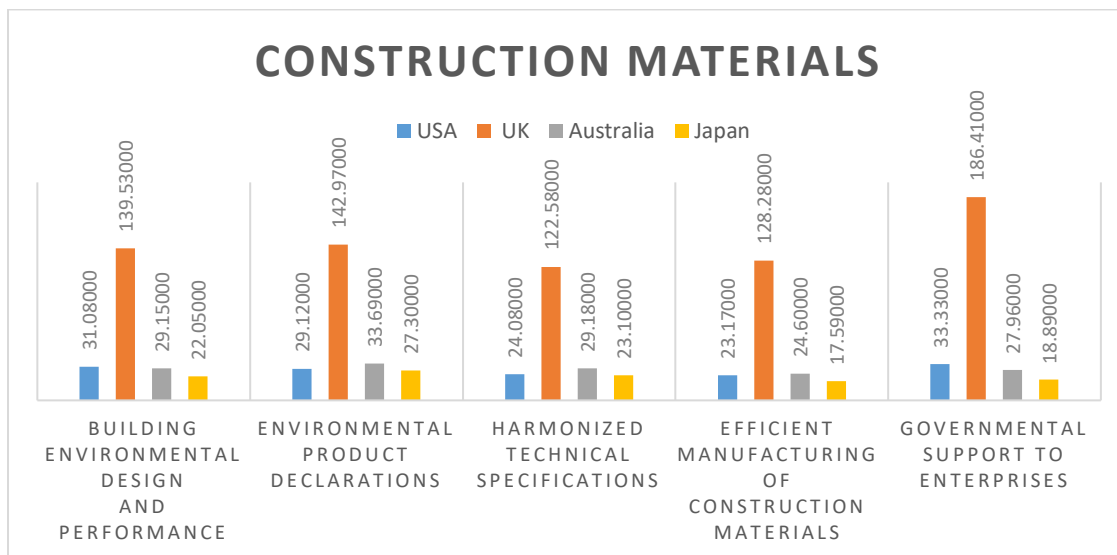


FIGURE 1. Construction Materials

Figure 1 shows the Construction Materials the USA it is seen that Governmental support to enterprises to plan is showing the highest value for Harmonized technical specifications is showing the lowest value. UK it is seen that Governmental support to enterprises to plan is showing the highest value for Harmonized technical specifications is showing the lowest value. Australia it is seen that Environmental product declarations is showing the highest value for Efficient manufacturing of construction materials is showing the lowest value. No influence it is seen that Environmental product declarations is showing the highest value for Efficient manufacturing of construction materials is showing the lowest value.

TABLE 2. Performance value

Performance value			
0.93249	0.74851	0.84391	0.79773
0.87369	0.76697	0.73019	0.64432
0.72247	0.65758	0.84304	0.76147
0.69517	0.68816	1.00000	1.00000
1.00000	1.00000	0.87983	0.93118

Table 2 shows the Performance value is divided by the maximum of the given value

TABLE 3. Weight

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

Table 3 shows the weight of the Construction Materials the weight is equal for all the value in the set of data in the table 1. The weight is multiplied with the previous table to get the next value.

TABLE 4. Weighted normalized decision matrix (WSM)

Weighted normalized decision matrix			
0.244392	0.176867	0.210978	0.199433
0.2123	0.216143	0.182547	0.161081
0.225609	0.184626	0.210761	0.190368
0.25	0.25	0.25	0.25
0.169931	0.219806	0.219957	0.232795

Table 4 shows the weighted normalization decision matrix it is calculated by multiplying the weight and performance value in table 2 and table 3.

TABLE 5. Weighted normalized decision matrix (WPM)

Weighted normalized decision matrix			
0.994344	0.917121	0.95846	0.945071
0.959959	0.964273	0.924397	0.895934
0.974662	0.927018	0.958214	0.934143
1	1	1	1
0.907995	0.968333	0.9685	0.982332

Table 5 shows the weighted normalization decision matrix it is calculated by multiplying the weight and performance value in table 2 and table 3

TABLE 6. Preference Score (WSM) (WPM)

Preference Score	WSM Weighted Sum Model	Preference Score	WPM Weighted Product Model
0.83167		0.826042	
0.77207		0.766632	
0.81136		0.808757	
1.00000		1	
0.84249		0.8365	

Table 6 shows the preference score of WSM Weighted Sum Model it is calculated by the sum of the value on the row of weighted normalized decision matrix. the preference score of WPM Weighted Product Model it is calculated by the product of the value on the row on weighted normalized decision matrix.

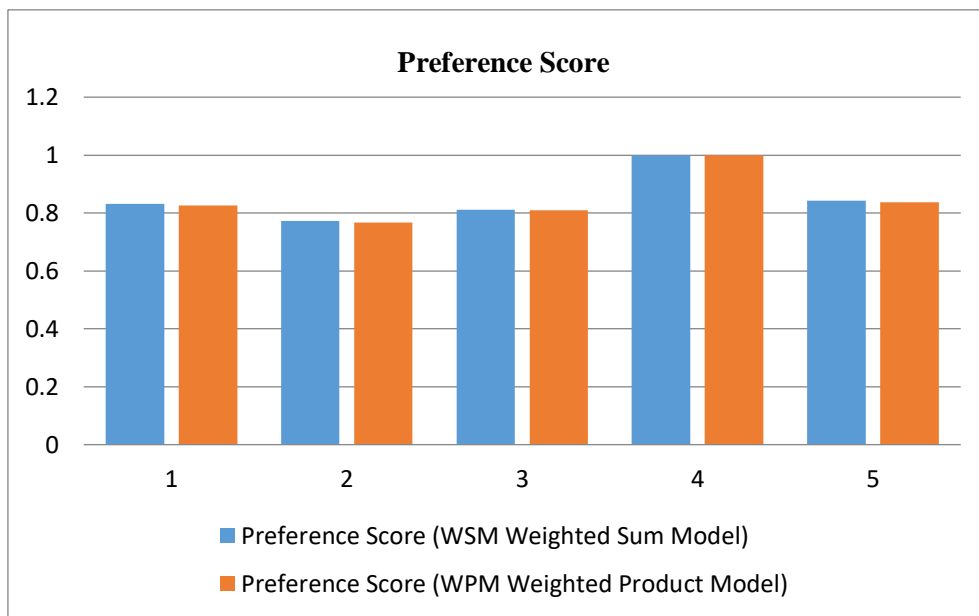


FIGURE 2. Preference Score (WSM) (WPM)

Figure 5 shows the preference score of WSM Weighted Sum Model it is calculated by the sum of the value on the row on weighted normalized decision matrix. Government unity of leadership to plan (WSM) (WPM) is the highest and the value the calculation of the WPM Weighted Product Model and WSM Weighted Sum Model.

TABLE 7. WASPAS Coefficient

lambda	WASPAS Coefficient
0.5	0.82886
	0.76935
	0.81006
	1.00000
	0.83949

Table 7 shows the WASPAS Coefficient value lambda 0.5.

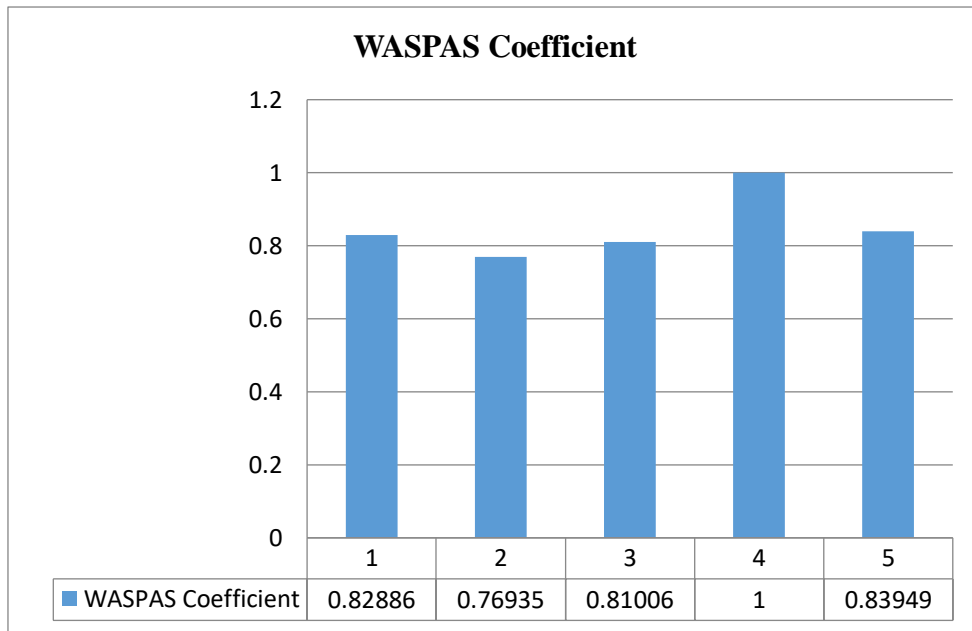


FIGURE 3. WASPAS Coefficient

TABLE 8. Rank

	Rank
Building environmental design and performance	3
Environmental product declarations	5
Harmonized technical specifications	4
Efficient manufacturing of construction materials	1
Governmental support to enterprises	2

Table 8 shows the Construction Materials the final result of this paper the Building environmental design and performance is in 3rd rank, Environmental product declarations is in 5th rank, harmonized technical specifications is in 4th rank, the Efficient manufacturing of construction materials is in 1st rank, Governmental support to enterprises is in 2nd rank. The final result is done by using the WASPAS method.

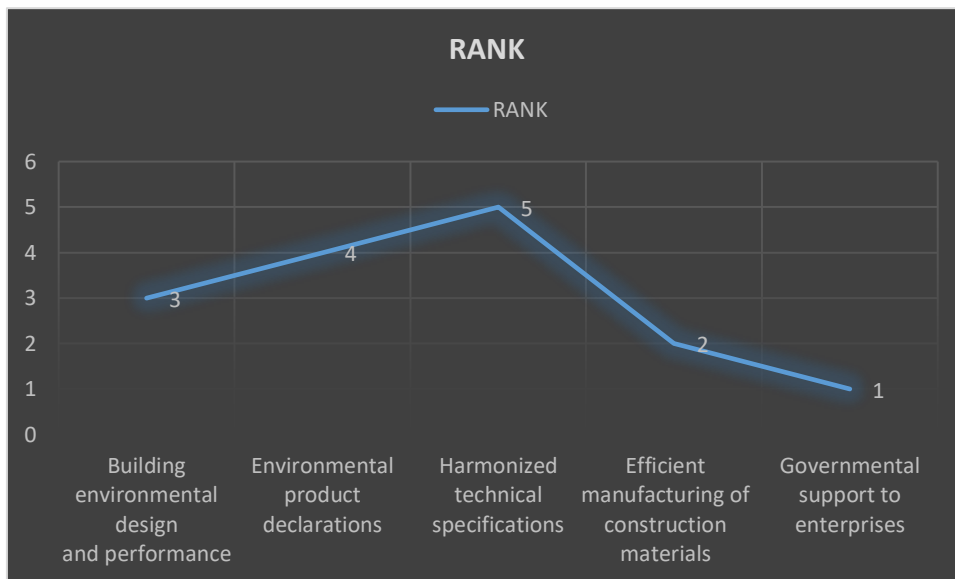


FIGURE 4. Rank

Figure 4 shows the Construction Materials the final result of this paper the Building environmental design and performance is in third rank, Environmental product declarations is in fifth rank, harmonized technical specifications is in

fourth rank, the Efficient manufacturing of construction materials is in first rank, Governmental support to enterprises is in Second rank.

5. Conclusion

Construction service during life, in the environment with the main pollution vector water key by communication the risk is possible. Wastewater or with aqueous solvents when in contact, that's the interaction phase exchange of impurities, transportation, and results in scattering. Leaks gather different items, it is the quality of the soil, the water, and the lifeblood, and on human health direct contact and water and consuming food cause impact. Construction nature in different ways of products to water bodies (meteorite, surface, and groundwater) exposed. The structure and surface of the object and the water cycle inside the object depend on it. Many common views have been identified. Another important role for environmental geologists, exactly it is to evaluate the character. For example, this includes: durable, structures worked in a strong, easy to be done and the construction attractive stone; in the protection of the shore to use as armored blocks excessively large relatively balanced stones; or easily glazed and large reasonable from vehicles to the road to crushing roads provision in bulk. Some of the world's durability and caused by cleaning the stone impacts, constant monitoring is needed. European in the natural environment the construction and the building of the building load, energy, materials, and water with the consumption and building department the relevant waste production from the data that is revealed clearly. Nevertheless, an environment of the construction sector awareness and consistency in improving the efforts of the efforts are a large number of terms, arise by introducing guidelines and initiatives. This review task is, about existing European policies and structured laws for the environment and especially overlay provides viewing. International the main of the law and the efforts a comparative assessment against components implementing, the environment of the sector will ensure consistency European in composing policies for the responsibility of the union activates the definition, more identify opportunities for progress shows. Complete life construction increasing the consistency of the department acting is promoted in the current law, where energy and cost savings identifying opportunities, efficient use, and waste achieving are recognized. True in the lush standard construction market these are the guidelines for changing work policymakers and the scientific community bilateral can. In this study, end building environmental design and the third performance in the ranking, the environment production notifications fifth in the rankings, compatible technical specifications fourth in the rankings, and construction efficient production of goods second in the ranking.

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