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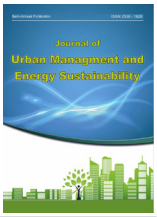

CASE STUDY RESEARCH PAPER

Investigation of green building concept in approach to supply chain criteria (Case Study: Babolsar city)

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ABSTRACT

In actuality, by utilizing innovative technology and sustainable building materials, green buildings contribute to the reduction of energy consumption and non-renewable resource use. By utilizing solar energy, dynamic air conditioning, efficient thermal insulation, and other sustainable technology, these buildings contribute to lowering air pollution and improving interior air quality. With this kind of management, everyone from independent contributors to construction management material producers achieves a shared goal of lowering environmental harm and boosting energy efficiency. Therefore, the current study's goal is to enhance supply chain management and control's ability to promote cooperation in the construction industry The current research is descriptive-analytical in terms of method and practice in terms of purpose. The collection of information in the current research is formed of library and documentary studies and field studies using questionnaire tools. The statistical population of the current research includes stakeholders in construction projects such as engineers, builders, owners and investors. In the questionnaire tool, 50 people were randomly selected from among the statistical population as a sample size. After that, the condition of the selected buildings in Babolsar city was investigated using the WASPAS method and their prioritization. The results show that Building number 2 is ranked first, Building No. 3 is ranked second, and Building number 1 is ranked third and also shown that the purpose of creating a supply chain in green buildings is to improve the performance of construction products and services in terms of quality and sustainability.

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INTRODUCTION

According to statistics from various institutions, the rate of urbanization and its continuous growth is projected to increase energy consumption to 80% of total consumption by 2050. (Tarkalam et al., 2023) and the biggest consumption in city is belongs to the big and middle scale projects. (Salehi and Naeemayi, 2022) Construction management is done with project-based management in which different responsibilities of independent parties in the construction process are determined separately. In a construction project, independent parties including owners, developers, architects, engineers, general contractors, subcontractors, consultants, suppliers and facility managers are involved and all must work in cooperation and coordination for optimal and successful project implementation (Ullah et al., 2017; Sudusinghe et al, 2018). Project-based management in construction requires detailed planning, regular execution, and effective control so that all parties are coordinated to achieve project goals. This type of management increases efficiency, reduces costs and execution time, increases the quality of construction and execution, and maintains customer satisfaction. In addition, this type of management reduces risks and problems during project implementation and increases productivity during the construction life cycle (Mourei, 2012). For a deeper understanding of how different aspects of construction work, case studies related to construction execution can be very helpful. These case studies usually analyze and investigate the performance and factors of success or failure in construction projects and help to better understand the executive and management processes in this field (Galal & Moneim, 2016). Also, supply chain management is a key issue in the construction industry that ensures improved efficiency and reduced costs by providing resources, equipment, materials and services needed for projects. Considering the integration of economic, environmental and social concerns, this type of management facilitates the improvement of business processes and communication with suppliers (Ahi & Searcy, 2013). In this regard, case studies in the field of supply chain management in the construction industry can show the best practices, key events and challenges in this field. These case studies usually analyze the strengths and weaknesses in the supply chain, improve the performance of different components of the chain, and increase cooperation between different project parties (Koberg & Longoni, 2019; De Angelis, 2018). Supply chain management plays a very important role as a strategic activity in organizations, affecting added value and customer satisfaction. By improving supply chain processes, companies are able to improve their services and ensure customer satisfaction by ensuring that materials and services are delivered correctly and on time. By improving customer satisfaction, companies are able to increase customer loyalty and increase sales and profitability. Also, reducing operating costs through improving supply chain processes helps companies to increase their competitiveness and generate more profitability (Ahi & Searcy, 2013; Galal & Moneim, 2016). In addition, supply chain management can contribute to economic development and job creation. By improving supply chain processes, companies can realize the improvement of society's living standards and the quality of people's lives and contribute to economic growth. Therefore, supply chain management plays an important role in improving the performance and performance of organizations and can help to achieve strategic goals and increase the sustainability of organizations. As an important professional field, supply chain management provides many job opportunities for people. People who have expertise in this field are able to work in various fields such as supply chain design and control, inventory management, warehousing, packaging and logistics (Koberg & Longoni, 2018). In addition, in developing countries, the existence of a strong and developed supply chain can greatly contribute to economic and social development.

This strong supply chain can help reduce costs and increase productivity, thereby allowing consumers to buy more products at a better price. By developing supply chain infrastructure and increasing efficiency in this area, it is possible to increase trade and economic growth. For this reason, expertise in the field of supply chain management can provide people with the attractive and prosperous job opportunities and help the development of communities and countries. Therefore, the current research seeks to measure the indicators of the supply chain in green buildings.

MATERIALS AND METHODS

Green architecture and its principles

Sustainable architecture and green buildings truly respond to the environmental challenges facing the global community. This type of design and buildings are considered by using natural resources, preserving the environment, reducing negative effects on the climate, and improving the quality of human life. Also, these types of buildings contribute to the sustainable and economic development and can help the environment and local communities in the long run. Using natural resources such as sunlight for lighting and heating, using long-life materials, recycling waste, and paying attention to the optimal use of energy and resources, all consider environmental improvements and sustainability. These methods represent a new way of thinking in the design of buildings and the use of sustainable and green technologies. In short, sustainable architecture and green buildings not only help to improve environmental conditions, but also help to improve the quality of human life and the sustainable development of communities. This new approach in architecture shows society's effort to respond to global challenges and guarantee a better future for future generations (Eshghi Saneti, 2015).

Green building and sustainability

Green building has more history than sustainable building. The appearance of the word is similar to green facade and roof, but it means natural environment and ecology. The concept of sustainable architecture is more comprehensive than the concept of green architecture (Kriegel and Nice, 2016). Sustainable architecture is derived from the concepts of sustainable development. It means meeting the needs of the present without jeopardizing the resources of future generations to meet their needs. In sustainable design, three issues of energy, climate and ecology are considered. In the picture below, the connection between the comprehensiveness of zero energy, green and sustainable building concepts is shown (Kriegel and Nice, 2016).

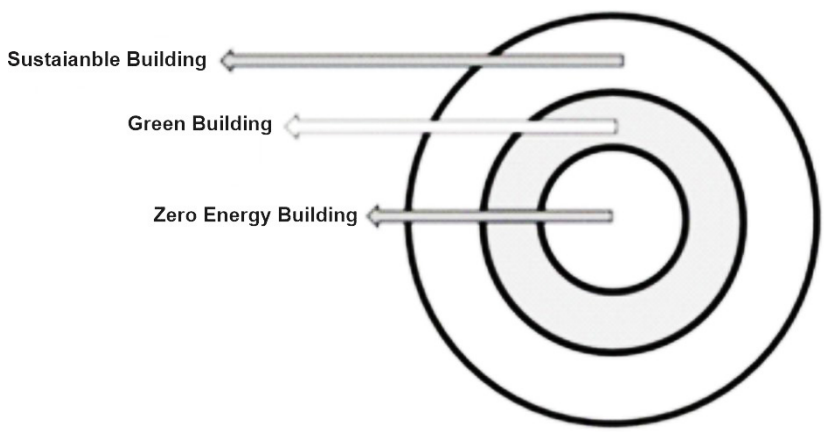

Figure 1: The connection between zero energy, green and sustainable building concepts

Ranking of sustainable buildings and architecture

United States Green Building Association USGBC, based on the LEED index, "Environmental and Energy Design Guide", has determined the criteria for rating and issuing certification in four levels, respectively, platinum, gold, silver, and the fourth level is only issuing certification to comply with the minimum index. Show The points criteria are divided into 8 major categories in the order of the highest points; Energy and atmosphere, quality of indoor environments, location and transportation, materials and resources, efficiency of water systems, sustainable sites, innovation in design and regional priorities (Kriegel and Nice, 2016; Razakian, 2017). The role of renovation and revival of old and existing buildings is very important in preserving the environment and reducing the use of new resources. Renovating old buildings is considered as a sustainable method to reuse resources and prevent excessive production of construction waste. Using recycled materials and recycled spaces to renovate and change the use of buildings not only helps to reduce the waste of resources and reduce environmental pollution, but also can reduce construction costs and contribute to the sustainable development of cities. Renovating old buildings in order to use them for new uses also plays an important role in preserving the history and culture of the society. This process can help preserve the community and its cultural heritage while saving natural resources. Therefore, paying attention to the renovation and revival of old buildings and their reuse is a sustainable and economical way to preserve the environment and sustainable development of cities. This trend shows the society's effort to improve environmental conditions and preserve natural resources for future generations (Beizawi and Shahriari, 2018).

- Connection with nature: Whether the building is inside the urban environment or in a more natural environment, connecting it with nature gives new life to the designed environment and brings a return to natural life.
- Understanding the environmental impacts: sustainable design tries to understand the environmental impacts through evaluation and analysis on the site. Evaluation of energy consumption and construction techniques can reduce negative environmental impacts through the use of sustainable construction materials and recyclable construction materials.
- Respect for users: This principle has little to do with environmental pollution and the destruction of the ozone layer. But the green process values all common resources in the construction of a complete building and does not consider humans out of this set. Respect for human needs and labor is considered in two ways. For a professional architect, it is necessary to pay attention to the fact that the safety and health of building materials and building processes, as much as it is important for its workers and users, is also very important for the entire human society. Architects became aware of the existence of different teams on construction sites and have prohibited the use of hazardous materials. Another form of participation, participation and positive involvement of users in the design and construction process is that if it is not used effectively, an efficient and useful resource will be wasted.
- Creating a collaborative process in design: sustainable designers know the importance of paying attention to various opinions, therefore, in the early stages of design, they collaborate with consulting engineers and experts, and they also benefit from the opinions of local residents and local neighbors. People's understanding: Sustainable or green designers should consider the culture, religion, and race of the people they are designing for (Beizawi and Shahriari, 2018).

Benefits of a green building

Green buildings or sustainable buildings are buildings that are designed and built with the aim of reducing negative impacts on the envi-

ronment and increasing the efficiency of natural resources. The advantages of these types of buildings include:

1. Reducing energy consumption: Green buildings minimize their energy consumption by using advanced technologies such as thermal insulation, high-efficiency air conditioning systems, natural lighting, and solar and wind energy generation systems.
2. Reducing air pollution: By using recycled materials and clean and sustainable technologies, green buildings create the less air pollution and help improve indoor and outdoor air quality.
3. Save water: Green buildings help save water by using rainwater harvesting systems, efficient water use, water saving systems and water treatment.
4. Increasing the efficiency of natural resources: By using recycled materials, reducing resource wastage and using renewable resources to provide energy, green buildings contribute to higher efficiency of natural resources.
5. Improving the quality of life: Green buildings with green spaces, natural lighting, reducing noise and pollution have a positive effect on the mood and health of people and improve their quality of life.

Therefore, green buildings play an important role in preserving the environment, saving resources, and increasing efficiency and social welfare (Torabi and Roshan, 2014).

Environmental crisis - global environmental problems

Looking at environmental issues from different angles, including the effects on human health and the environment, plays an important role in the formation of man-made spaces. Since the 1980s, with increasing awareness of the negative effects of global warming and environmental degradation on human health and societies, architects have found a greater role in responding to these challenges. Architects, as designers of living spaces, have a great responsibility in interacting with the environment. They can provide healthier, more hygienic spaces with higher biological quality by using sustainable methods and technologies. This includes the use of recycled materials, solar building design, optimal use of natural lighting, water harvesting systems, and the application of energy management and renewable energy technologies. As a sustainable architectural approach, sensitivity to the environment not only helps to improve the quality of human life, but also helps to preserve and protect natural resources and the balance between humans and the environment. This type of approach is very important in the development of man-made spaces as a sustainable and harmonious process with the global biosystem.

Sustainable design as a response to environmental crises

Understanding the environment in architecture is possible only by understanding human activities in the surrounding world, and architecture can be seen as the creation of a human image within the physical form. Sustainable architecture requires a balance between people, environment and economic prosperity. These three elements should be considered harmoniously in the design and implementation of man-made spaces. Context-oriented architecture, with an emphasis on the earth orbit and the connection between the environment and the space, allows designers to create spaces that are in harmony with nature with a deep understanding of the messages of the surrounding environment. This type of architecture, according to the culture, community, history, climate and specific conditions of each site, designs and implements buildings that are compatible with the environment and ecology. For example, the use of local and recyclable materials, the optimal use of natural lighting, the design of water collection systems and the use of sustainable technologies are in sync with the context-oriented architectural concepts. This type of design ensures obtaining a healthy, stable and harmonious space with the environment (Yazdi and Arefian, 2019).

Green building materials and technologies

Technologies and materials are used in a green building, the main reason for its difference from ordinary buildings is their high efficiency. Here are just a few of the materials and technologies used in green building. ICF insulated concrete, SIP building insulation panels, heat pump, radiant floor heating, energy recovery ventilators, solar hot water for domestic use, demand based water heaters, dual flush toilets, Low water flow toilets, water saving faucets, humidity control stations, insulating foams, use of LED for lighting, fluorescent lamps, bamboo flooring, cork flooring, rainwater irrigation system, A landscape with a native view, porous concrete or sponge, insulation made of mushrooms (Khormi et al., 2011).

Applications of green materials

Avoid chemicals that destroy the ozone layer in mechanical equipment and insulation.

- To use waste construction materials with products obtained from materials that can be returned to the cycle of nature.
- Use guaranteed timber obtained from controlled forests.

Technology and building materials have always played an important role in architectural developments. From the ancient times when people used stone and wood for construction, until today, with the advancement of technology and the development of new materials, much more facilities has been provided for the design and implementation of buildings (Golabchi, 2018). Currently, with the progress in the field of smart materials, materials with special capabilities such as smart thermal insulation, smart lighting systems and smart energy systems, architects and designers have access to many more advanced tools. These new facilities help them to design buildings with high efficiency, sustainable and smart that are compatible with human and environmental needs (Arbabi Yazdi and Rafti Sidi Yazdi 2011). Therefore, architects and designers can create innovative, sustainable and suitable spaces for human life by using new materials and technologies. This effective interaction between materials, technology and architecture ensures the improvement of the quality of human life and contributes to the sustainable and dynamic growth of the construction industry (Georji Mahlbani and Haj Abutalebi, 2018). The words smart, smart, sensitive are all used to define structures and materials that include sensors and actuators and have the ability to adapt to external stimuli such as loads and environmental stimuli. Smart materials is a new term for materials and products that have the ability to understand and process environmental events and react appropriately to them. In other words, these materials have the ability to change and are able to reversibly change their shape, form, color and internal energy in response to the physical or chemical effects of the surrounding environment. Intelligent architecture is dynamic, which means that its main functional parameters change according to the need, demand and changing and dynamic conditions. An intelligent architecture, like a living system, is capable of gathering experience and using experiences in new conditions, and with this characteristic of dynamism and self-organization, it guarantees the system. The main features of smart architecture in green materials are:

- Versatility
- Dynamics and being active
- Flexibility
- Compatibility with the environment
- Responsiveness and responsiveness (Turkjezi and Bastani, 2012).

Types of supply chain

In general, there are two types of closed loop supply chain and open loop supply chain, which we will introduce below:

Closed loop supply chain: In this type of supply chain, materials and resources return to the organization's production chain and are used again. This is done instead of throwing away waste and aims to design a sustainable system that minimizes or near zero waste. Most of the food industry, fast food, and the production and distribution of beverages are in this category.

Open loop supply chain: When in an organization, used products do not return to the original company and are recycled and used by another company, we call it an open loop supply chain. In such a structure, products that have been converted into raw materials are used in the production of other materials. For example, used Nike brand shoes are used as fibers. The difference

Between open loop and closed loop supply chain is that the used and recycled products return to the original company or are used in another organization (Hemti Gestaseb, 2022).

Types of supply chain management

There are different types of supply chain management, each of which has its own advantages and disadvantages and is chosen according to the type of business. A wrong choice can cause irreparable damage to the organization. Continuous flow supply chain management: One of the most traditional and oldest supply chain methods is the continuous flow type. This type is considered the best choice for stable industries and businesses; Because stability is necessary in it. In this method, there is a stable level of demand and uniform goods flow between the manufacturer, distributor and customer. Fast supply chain management: This management method is used for products that have a short life cycle. For maximum efficiency and proper sale of this type of products, special activities and skills are needed.

Efficient supply chain management: Efficient supply is used in competitive industries, and its purpose is to maximize efficiency and predict proper production, and for this, appropriate and sufficient raw materials and machinery are needed. The slightest inefficiency along this chain will have significant and sometimes irreversible effects on the entire supply chain. The challenges of this type of chain; The lack of labor is the reduction of primary raw materials or the disruption of the production process, which opens the way for competitors.

Agile supply chain management: This method is dedicated to specialized items that require more care in the network. Agile supply chain management with the aim of transporting and distributing specialized goods with the help of technology has been required. Transportation in this branch of products has a higher cost, and the equilibrium limit in the volume of products must be observed in order to be economical. This method is opposed to the continuous method.

Customized supply chain management: Customized supply chain management is a combination of agile model and continuous model, and its settings can be changed and manipulated. In this case, the product is customized in one or more stages of the chain.

Flexible supply chain management: In this model, it is possible to manage demand in unstable conditions. With the help of flexible management, demand can be managed during peak sales seasons and then adjusted as demand declines. For the optimal implementation of this method, procurement and logistics software is needed (Bashartizadeh et al., 2022).

The purpose of supply chain management

Supply chain is the backbone of today's commercial organizations and businesses. Supply chain management strategies give more value to the customer than other methods and strategies in a business and therefore can have a significant impact on the progress of the organization.

Objectives of supply chain management: 1- Improving efficiency; 2- improving quality; 3- Optimizing logistics transportation; 4- reducing costs; 5- increasing customer satisfaction; 6- Improving broadcasting and distribution; and 7- increasing coordination in the chain.

The main purpose of supply chain management is from these various factors that you mentioned. These goals aim to improve efficiency and effectiveness in processes, increase the quality of products and services, optimize logistics transportation, reduce costs, increase customer satisfaction, improve distribution and distribution of products, and increase coordination and cooperation throughout the supply chain (Mohteshmi and Bahrami, 2022). By improving efficiency and quality in supply chain

processes, companies are able to experience improved profitability and performance. Optimizing logistics transportation reduces delivery time and transportation costs. Reducing costs in the supply chain helps to increase profitability, and increasing customer satisfaction increases positive feedback and increases product sales (Dukohaki et al., 2022). Improving distribution and distribution of products increases access to products for customers, and increasing coordination in the supply chain improves communication, cooperation and interaction between members of the supply chain. As a result, supply chain management, with its positive effect on efficiency, quality, costs, customer satisfaction and coordination in the supply chain, helps to improve the performance and performance of companies (Gholamian et al., 1401).

Methodology

The current research is descriptive-analytical in terms of method and practical in terms of purpose. Information and data used in this research through library studies, field studies through books, doctoral theses, master's theses, referring to related organizations such as Mazandaran Engineering System Organization and office The representativeness of the engineering system of Babolsar city has also been collected using the observation tool. The statistical population of the current research includes stakeholders in construction projects such as engineers, builders, owners and investors. In the questionnaire tool, 50 people are randomly selected from among the statistical population as a sample size. After that, the condition of the selected buildings in Babolsar city (Three buildings) will be examined using the WASPAS method and their prioritization.

Source: Yu et al, 2022; Amin & Zhang, 2012; Badi & Murtagh, 2019; Dev et al., 2020; Fawcett et al., 2017; Hemti Ghstasb, 1401; Morei, 2012; Mohammadi and Saqbi, 1400; complete, 1400; Piran-Najad, 2015

Table 1: Symbols related to research criteria and indicators

Criteria	Symbol	Indicator	Indicator symbol
Social	S	Obligation	T
		Culture and health	F
		Participation	M
		References	N
		Consciousness	A
Environmental	E	Sustainability	P
		Quality	K
Economic	C	Cost	H
		Access to financial resources	D

DISCUSSION AND FINDINGS

In Babolsar city, three buildings have been selected and the indicators of the present research were distributed among the construction workers and their supervising engineers in the form of a questionnaire.

Table 2: Status of supply chain indicators in selected buildings in Babolsar city

Babolsar city	Average		
	Social	Environmental	Economic
Building 1	2.61	1.60	2.18
Building 2	3.51	2.50	3.55
Building 3	2.66	2.30	3.45
Total	2.93	2.13	3.06

According to table number 2, the status of supply chain indicators in the selected buildings of Babolsar city is weak in terms of social criteria with an average of (2.93) and environmental criteria with an average of (2.13) and in terms of economic criteria with an average of (3.06) it is good. Shows Figure 2 the status of supply chain indicators in selected buildings in Babolsar city.

Investigating the status of supply chain indicators in selected buildings in Babolsar using the WASPAS method and ranking them Waspas measurement model or tool is one of the new methods of multi-indicator decision-making

and was introduced in the last decade by a person named Zavadskas, which has a hybrid mode and is a combination of two weighted sum models and weighted multiplication models, which It is very accurate compared to the independent mode. This model is such that first the mean and standard deviation of statistical data are calculated and obtained through SPSS software and its matrix is formed. After the formation of the statistical data matrix, it is determined whether the statistical data is positive or negative through the inference of the provided indicators. Then, the variance of the weighted sum of the data is taken, which is the result of the specified weights. The weights of each city are obtained by multiplying the specified weights with each other. And the higher the number of this product, the higher it is, and vice versa. With table number 3, the score of each option is presented in relation to the criteria.

Table 3: Decision matrix of options based on criteria

Weight	0.218	0.151	0.630
Direction	+	+	+
	Social	Environmental	Economic
Building 1	0.582	0.309	0.109
Building 2	0.127	0.186	0.678
Building 3	0.333	0.140	0.528

Since, based on the above matrix (Table No. 3), the direction of all three criteria is positive, so we use the following formula to normalize the matrices:

$$X_{ij} = \frac{xij}{\max(xij)}$$

Table 4: Normalization of the initial decision matrix

Options	Social	Environmental	Economic
Building 1	1	1	0.159
Building 2	0.218	0.602	1
Building 3	0.572	0.453	0.769

In this step, after normalizing the decision matrix, using the weighted sum model and the following formula, we calculate the preference values of the options. (Table No. 5)

$$A_i^{WPM} = \sum_{j=1}^{n} WjXij$$

Table 5: Calculation of the preference value of the options based on the weighted sum model

Weighted Sum Model	
Building 1	0.46917
Building 2	0.76843
Building 3	0.67757

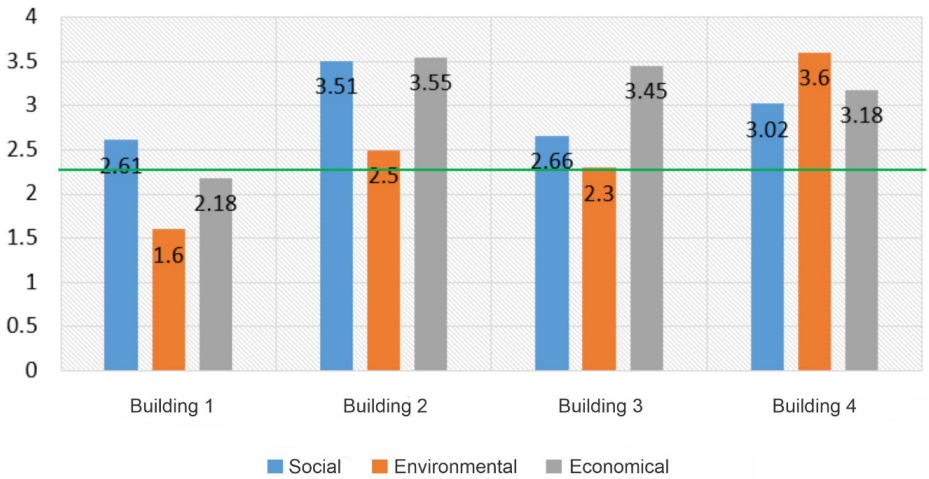

Figure 2: Status of supply chain indicators in selected buildings in Babolsar city

In the next step, using the weighted multiplicative model and the following formula, we calculate the preference values of the options. (Table No. 6)

$$A_i^{WPM} = \tilde{O}_{j=1}^{n} Xij \wedge Wi$$

Table 6: Calculating the preference value of the options based on the weighted multiplicative model

Weighted Product Model	
Building 1	0.18421
Building 2	0.39049
Building 3	0.39104

Waspas method was used to check the status of supply chain indicators in selected buildings in Babolsar city. In this way, the studied buildings have been investigated for the performance of the supply chain. In the first step, the weighted sum of each principle is obtained in the form of table number 5. In the second step, the weighted multiplication of each principle based on the dimensions effective in improving the condition of the supply chain indicators in the selected buildings in Babolsar city has been obtained (Table No. 6) And finally, using the following formula, the final score of the three buildings has been obtained. Come. (Table No. 7)

$$Q_i = / Q_i^1 + (1 - /) Q_i^2$$
$$/ = 0.5$$

RESULT AND CONCLUSION

According to table no. 7, the buildings located in Babolsar city were prioritized in terms of supply chain indicators, which has been determined that building no. 2 is in the first place, building no. 3 is in the second place and building no. 1 is in the third place. Is placed the supply chain in green buildings is a management system that improves the efficiency and quality of processes and activities related to the production, transportation, storage, distribution and consumption of materials and products related to green buildings. This management system aims to ensure the quality and sustainability of products and services used in green buildings by improving performance and coordination in the supply chain. The supply chain in green buildings includes all processes and activities related to the selection and use of green materials, optimal use of energy, use of sustainable technologies, environmental protection, reduction of waste and consumption of natural resources. This supply chain helps to improve efficiency and quality in green buildings with cooperation and coordination between all chain members, from raw material producers to end consumers, thereby helping to preserve the environment and natural resources.

The supply chain in green buildings includes the following:

1- Provision of green materials: selection and supply of building materials with the least environmental impact and with high efficiency from sustainable sources.
2- Energy management: optimal use of energy in manufacturing processes and use of sustainable technologies to reduce energy consumption.
3- Environmental protection: compliance with environmental standards in the processes of production, transportation, installation and use of materials and equipment.
4- Reducing waste: using new methods and technologies to reduce production waste and throw away materials in construction processes.

Table 7: Calculation of the amount of vespas based on the sum and weighted multiplication values

Options	Weighted total amount (Qi1)	The value of weight coefficient (Qi2)	Amount of gratitude (Qi)	Rank
Building 1	0.46917	0.18421	0.32669	3
Building 2	0.76843	0.39049	0.57956	1
Building 3	0.67757	0.39104	0.53430	2

5- Management of natural resources: optimal use of natural resources such as water, soil, and air in construction processes.

6- Cooperation and coordination: creating coordination and cooperation between all members of the supply chain from raw material producers to end consumers to improve efficiency and quality in green buildings.

7- Added value: increasing the added value in the supply chain by improving the performance, efficiency and quality of products and services related to green buildings. Creating a supply chain in green buildings is done with the aim of improving the performance of construction products and services in terms of quality and sustainability. This system causes fewer natural resources to be consumed, reduces greenhouse gas emissions and helps preserve the environment. With this approach, green buildings are proposed as a sustainable solution to protect the environment and improve the quality of human life, and efforts are made towards the sustainable development of society. This process not only helps the environment but also reduces economic costs due to saving resources and increasing efficiency.

REFERENCES

Ahi, P.; Searcy, C. (2013), A comparative literature analysis of definitions for green and sustainable supply chain management. J. Clean. Prod. 2013, 52, 329–341.

Amin, S. H. Razmi, J. (2009), An integrated fuzzy model for supplier management: A case study of ISP selection and evaluation, EXPERT SYST APPL, vol. 36, pp. 8639-8648.

Arbabi Yazdi, Amir. Rafati Sidi Yazdi, Mehdi (2013), Smart materials and their effect on the creation of unique architecture, the first national conference on lasting building, Mashhad, Deputy of Urban Planning and Architecture of Mashhad Municipality

Badi, S., Murtagh, N. (2019), Green supply chain management in construction: A systematic literature review and future research agenda, Journal of Cleaner Production.

Bashartizadeh, Reza. Toloui Ashlaghi, Abbas. Radfar, Reza (1401), the dynamic system model of the supply chain of the steel industry with the approach of realizing economic goals, Business Management, No. 55, pp. 111-130.

Beyzawi, Mohammad Reza. Shahriari, Shahrazad (2017), the role of the environment and open space in sustainable architecture, the 6th scientific research congress on the development and promotion of architectural sciences and urban planning in Iran, Tehran

De Angelis, R.; Howard, M.; Miemczyk, J. (2018), Supply chain management and the circular economy: Towards the circular supply chain. Prod. Plan. Control. 2018, 29, 425–437.

Dev, Navin K. Shankar, Ravi. Qaiser, Fahham Hasan (2020), Industry 4.0 and circular economy: Operational excellence for sustainable reverse supply chain performance, Resources, Conservation and Recycling, Volume 153, February 2020, 104583.

Dokohaki, Fatima. Askarifar, Kazem. Ebrahimi, Abolqasem (1401), functional bottlenecks of the wholesaler-retailer two-level supply chain in the food distribution channel, Supply Chain Management, No. 76, pp. 75-87.

Eshghi Saneti, Alaleh (2015), the impact of modern technology on sustainable architecture, International Conference of Civil Engineering, Architecture and Urban Development Elites, Tehran, Saramed Karin Institute

Fawcett, S.E.; Fawcett, A.M.; Jin, Y.H.; Magnan, G. (2017), I Know It When I See It: The Nature of Trust, Trustworthiness Signals & Strategic Trust Construction. Int. J. Logist. Manag. 28, 914–938.

Galal, N.; Moneim, A.F.A. (2016), Developing sustainable supply chains in developing countries. Procedia CIRP 2016, 48, 419–424.

Gholamian, Elham. Sharifi Qazvini, Mohammadreza. Davodi, Seyyed Mohammad Reza (2022), supply chain design based on two-stage stochastic programming of mean-value at risk conditional with

the possibility of equipping suppliers in the event of disruption, Supply Chain Management, No. 76, pp. 107-117.

Gulabchi, Mahmoud. Taghizadeh, Ketayoun. Soroush Nia, Ehsan (2019), Nanotechnology in Architecture and Construction Engineering, Tehran University Press.

Hemti Ghstasab, Armin (2022), Prioritization of factors affecting information sharing in the supply chain based on multi-criteria decision-making technique under conditions of uncertainty (Ofoq Korosh chain store, Shiraz), Management Science in Industry, No. 2 , pp. 85-46.

Khorrami, Mohammad. Deputy, Sohaila. Mishkoh Razavi, Hossamuddin (2019), the necessity of implementing green buildings in Iran and comparing it with conventional buildings today, National Conference of Iranian-Islamic Architecture and Urban Planning, Mashhad, Khavaran Institute of Higher Education

Koberg, E.; Longoni, A. (2018), A systematic review of sustainable supply chain management in global supply chains. J. Clean. Prod. 2019, 207, 1084–1098.

Kriegel, Adele. Nice, Bradley (2016), Green BIM, building information modeling with a sustainable design approach; Translated by Maziar Asefi, Mohammad Sadat Madershahi; Qazvin: Academic Jihad Publications.

Mehlbani Gurji, Youssef. Haj Abutalebi, Elnaz (2008), Smart materials and their role in architecture, Rural Housing and Environment Quarterly, Volume 28, Number 127, pp. 66-81

Mohammadi, Mehrdad. Thaqbi, Alireza (2021), Identification of cost increase factors in construction projects using fuzzy multi-indicator decision-making approach (case study: Tehran Municipality), New Research Approaches in Management and Accounting, No. 63, Volume II, pp. 101 -82.

Mohtashmi, Ali. Bahrami, Dawood (2022), factors and dimensions affecting the supply chain of parts and equipment needed in the oil industry in conditions of uncertainty, Supply Chain Management, No. 76, pp. 106-89.

Morei, Reza (2012), establishing a project management office in project-oriented organizations, why and how, bimonthly electronic journal of knowledge and application, second year, number 5, pp. 1-2.

Piran-nejad, Ali (2016), meta-analysis of knowledge management researches in Iran's government organizations, Government Management, Volume 8, Number 2, pp. 299-324.

Razzagian, Farzaneh (2017), Analysis of the principles of green architecture through the LEED index in the high-rise buildings of Mashhad; The fourth national conference of new technologies of the construction industry.

Salehi, A. M., & Naeemayi, H. (2022). Improving The Urban Heat Island (UHI) Phenomenon by Converting the Simulated Urban Space into a Linear Model. International Journal of Urban Management and Energy Sustainability, 3(1), 13-22. doi: 10.22034/jumes.2021.556727.1078

Sudusinghe, J.I.; Jayaratne, R.P.; Kumarage, A.S. (2018), UN SDGs Shaping Sustainable Supply Chains: The Case of Apparel Manufacturers in Developing Countries. In Proceedings of the 2018 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI), Singapore, 31 July–2 August 2018; pp. 102–107.

Tarkalam, G., Bitaraf, E., & Bordbar, M. (2023). Evaluation of energy consumption of tropical houses in approach to sustainability (Case Study: Tehran City). International Journal of Urban Management and Energy Sustainability, 4(4), 71-82. doi: 10.22034/jumes.2023.2014461.1169

Turabi, a concubine. Roshan, Mohsen (2014), the application of smart materials in the architecture of green buildings, the first annual conference on architecture, urban planning and urban management research, Yazd, Rah Mehrazi Ambassadors Institute of Architecture and Urban Planning

Turkjezi, Milad. Bastani, Mahyar (2012), The use of solar systems in buildings is a new solution to optimize energy consumption, the first national conference on new and clean energies, Hamedan, Hamandishan Farda Environment Co.

Ullah, F.; Thaheem, M.J.; Siddiqui, S.Q.; Khurshid, M.B. (2017), Influence of six sigma on project success in construction industry of Pakistan. TQM J. 29, 276–309.

Yazdi, Kazem. Arefian, Nima (2019), How sustainable architecture is in the age of technology, National Conference on Civil Engineering, Architecture, Urban Planning and Energy Management, Ardestan, Ardestan Islamic Azad University

Yu, Yifei. Yazan, Devrim Murat. Junjan, Veronica. Iacob, Maria-Eugenia (2022), Circular economy in the construction industry: A review of decision support tools based on Information & Communication Technologies, Journal of Cleaner Production, Volume 349, 15 May 2022, 131335.

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