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Designing a Resilient-Sustainable Supplier Selection Model

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Selecting resilient-sustainable suppliers can improve sustainability status and reduce supply chain disruption. This study aims to design a model for selecting resilient-sustainable suppliers in the supply chain of the Shahid Ghandi Corporation Complex. For this purpose, after reviewing the theoretical literature, 76 and 50 indicators were identified for evaluating sustainable suppliers and resilient suppliers, respectively. These indicators were investigated by supply chain experts in Shahid Ghandi Corporation Complex and, then, 15 indicators were determined to be suitable for each of the sustainable and resilient suppliers. A questionnaire was distributed among the supply chain experts of Shahid Ghandi Corporation Complex and the resilient-sustainable supplier selection model was confirmed using confirmatory factor analysis (CFA) based on the 136 questionnaires gathered from the participants. Sustainability indicators were classified into three economic, social, and environmental dimensions, and resilience indicators were divided into three categories of absorptive capacity, adaptive capacity, and restorative capacity. The results showed that the economic dimension had the first rank, the environmental dimension the second rank, and the indices of adaptation capacity, restorative capacity, social capacity and absorption capacity in choosing the sustainable-resilient supplier model were the next priorities, respectively.

Keywords: *Supplier selection; Sustainable supplier; Resilient supplier.*

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1. Introduction

With the extending demands of the industrial process resulting from the technological solstice, the corporation has faced serious challenges such as competition in global industries, increased market unpredictability, inflation, demands for customized products, and shortened product reconstruction cycle [1-2]. Due to the environmental pollution, lack of resources, and intensification of competition, countries, organizations, and academics have reached a consensus on sustainable development. In such circumstances, balancing economic benefits with sustainable development receives great attention from modern companies for the management of production operations. Sustainable supply chain management (SSCM) is an effective management style that considers economic, environmental, and social functions simultaneously [3-4]. Over the past couple of decades, sustainability in maintaining the natural environment and increase long-range relationships has increasingly focused on production or service activities. Therefore, sustainability observation has gradually become an important topic in supply chain management[5]. Promoting sustainability in supply chains forces purchasing managers to use this principle. Supplier selection is a key decision for purchasing managers in the supply chain. Hence, sustainable supplier selection has received a lot of attention in studies[6].
With the globalization trend, supply chains are more exposed to natural, human, and technological catastrophes Including floods, earthquakes, fires, transportation incidents, worker strikes, terrorist attacks, etc. These disasters disrupt the supply chain, which is detrimental to organizations in terms of lost productivity, revenue, competitive advantage, profitability, etc. Therefore, providing a resilient supply

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chain approach is a necessity to protect the buyer from deficiencies and disruptions [39]. Given that a supplier affects the supply chain's success, resilience should be considered in decision-making for supplier selection to reduce business risk. Which has been mentioned in some studies on supplier selection[7-9]. Nowadays, disruptions have reduced supply chain sustainability goals. Therefore, there are new challenges for supply chain managers to suggest an efficient supply chain, which withstands any disruption and has sufficient vigilance to provide the same sustainability under a disruptive event [10-12].In their study, Marchese et al. [13]considered both resilience and sustainability in the supply chain and examined their relationship in terms of these two aspects. However, the concept of sustainability and resilience in supplier selection has been also surveyed independently [14-15]. Studies have suggested that the relationship between the aspects of resilience and sustainability has been ignored in supplier selection. In other words, some studies have focused only on resilience criteria to evaluate suppliers and have not considered sustainability criteria. However, it is untrue to argue about sustainable supplier selection without contemplating the aspects of resilience, especially when sustainability is affected by disasters and accidents. Given the importance of sustainability and resilience, the supplier should be selected in a way that in addition to sustainability indicators, the characteristics of a resilient supplier are taken into account. In other words, a supplier should not only respond to crises but also achieve greater performance and capability and react best to events in the shortest possible time. Therefore, it can be deduced that resilience is among the most important issues for achieving sustainability in supplier selection.

The results of reviewing the theoretical foundations and research background by the researcher showed that although several studies have been conducted separately in the field of selecting a sustainable supplier and resilient supplier, so far, a model that simultaneously resilience and supplier stability Considered, not observed. From the operational point of view, although the stability of suppliers has been considered in manufacturing companies and in particular in Shahid Ghandi Company, due to changing environmental conditions such as economic conditions (inflation, exchange rate changes, etc.) and sanctions. Numerous environmental risks and issues, supply chain resilience issues have become very important. Ideally, the model used by companies should simultaneously consider the dimensions of sustainability and resilience that have not been available before. Therefore, the present study, while filling the existing research gap, can meet the concerns of manufacturing companies, and in particular Shahid Ghandi in the selection of suppliers, and is also a scientifically innovative topic.Therefore, after an extensive review of scientific works, this study proposed a framework to provide a sustainable-resilience supplier selection model.

2. Theoretical foundations of research

2.1. Sustainability

The concept of sustainability and sustainable development was presented by the World Commission on Environment and Development (WCED) in 1987, which released a report entitled “Our Common Future”, also known as Brundtland Report, and was defined as a development process that meets current needs without jeopardizing the needs of future generations. Sustainable development also emphasizes the interdependence between social, economic, and environmental dimensions of sustainability [16,17,40]. Financial, environmental, and social aspects should be seriously taken into consideration when deciding on business and policies. Most of the studies have shown that the sustainability concept has been evolved from the relationship between economic, environmental, and social parameters [18,41,42].In addition, the three dimensions of sustainability, i.e. environmental, economic, and social, are integrated with supplier management activities and then added to the entire supply chain and production operations through the entire value chain. Accordingly, many researchers try to address the problem of evaluating and selecting a sustainable supplier by providing various tools and techniques [6,19.20]. As mentioned, the three main pillars of sustainability are its economic, environmental, and social aspects[21,35].

Environmental sustainability: An environmentally sustainable system maintains a stable basic resource and prevents overexploitation and destruction of environmental resources. In environmental sustainability, biodiversity, atmospheric stability, and other ecosystem functions, which are not normally classified as economic resources, should be maintained [22,36,37,41].Economic sustainability: Economic sustainability refers to the selection of the best option based on the existing economic knowledge, leading to broad economic growth and long-term development. Economic growth alone is not sufficient, but it is valuable as a means to improve human life. Accordingly, economic sustainability should be sought in the context of other prioritized policies such as political and social sustainability, cultural occasions, and the proper management of natural resources. It should also be emphasized that economic sustainability, in general, and structural adjustment, in particular, are global challenges that most countries have faced in the world[21].Social sustainability: Social sustainability refers to the continuation of a civilization in which human beings witness a fair distribution between the rich and the poor and the improved quality of life is the result of such type of sustainability. In general, reducing social tensions, organizing following social conditions, equality of human rights between the disabled, women, and racial, ethnic, and religious groups, education and environmental awareness, healthcare, providing adequate housing for all people, promoting the role of the family, community participation, political rights, and promoting community currencies are the main axes of social sustainability [21].

2.2. Resilience

The term “resilience” in the supply chain was first proposed by Sheffi [23]Resilience is the capability of a system to return to its original state or achieve a more desirable state after being disturbed[34,38]. It is generally assumed that many changes occur in this process. Resilience is considered a distinct source of sustainable competitive advantage for suppliers. The capability of suppliers to manage risks, i.e. the ability to respond to disruptions better than other competitors, indicates the resilient nature of suppliers [24].Many definitions have been presented for resilience by various researchers. Most of the studies have defined resilience as the “degree of sustainability of systems”. This concept has been applied in several disciplines including economics, politics, engineering, and planning. However, in supply chain and risk management studies, resilience is considered among the requirements of the system that includes various features. According to Lee, these features are very broad. Agility, adaptability, and alignment are considered the key aspects of supply chain resilience [25]. Some researchers have suggested four complementary and basic measures for a resilient supply chain, including stability, redundancy, quality, and recycling rate. According to Ponomaro and Holcombe, in addition to readiness, reaction and recycling are also considered as the supply chain features. Sony and Jane also added flexibility, visibility, collaboration, adaptability, and stability as features needed to accelerate resilient supply chains.The three main pillars of resilience are absorptive capacity, adaptive capacity, and restorative capacity[26].each of which is briefly described below:

Absorptive capacity is an endogenous property of a system, i.e. the capability of a system to automatically absorb the effects of a disruptive event to minimize exposure or sensitivity to shocks. This is the first line of defense that resists disruption and shock tolerance caused by accidents. Absorptive capacity is a system including a set of preventive Actions and a strategic period that should be developed before the disruption occurs to avoid permanent adverse consequences [26].Adaptive capacity regulates disturbances and shocks caused by a destructive event. Adaptive capacity, as the second line of defense, is defined as the ability of a system to adapt itself and try to cope with negative outcomes or potential detriment without any remedial action. This is part of the post-disaster strategy, also known as “response capacity” [26].Restorative capacity, as the ultimate line of defense, is the point of the ease with which the system can permanently improve itself against a disruptive event. This is highly dependent on budget recovery and technical resource recovery. If stakeholders do not receive sufficient financial and technical support, the restorative capacity will not be fully achieved[2].

2.3.Research background

To search for research records, first the keywords of resilient-sustainable supplier selection as keywords were used as the basis of the search. The search results showed that no research was found that simultaneously examined resilience and sustainability and provided a comprehensive model. The table below summarizes some of these studies that have focused on sustainable supplier selection and resilient supplier selection.

Authors (year)	objective	Technique . approach	Criteria
Ahmed Mohammed[27]	Towards 'gresilient' supply chain management	quantitative study	Development, Agility, Robustness, Sensing, Flexibility
Mahmudul Hasan et al[2].	. Resilient supplier selection in logistics ٤.٠ with heterogeneous information	FTOPSIS &)MCGP(	Quantitative attribute(Pre-positioned inventory level, Lead time variability, Production capacity, Cost) Qualitative attributes(Digitalization, Traceability, Supply chain density, Supply chain complexity, Re-engineering, Supplier's resource flexibility, Automation disruption, Information management, Cybersecurity risk management, Supplier reliability, Supply chain visibility, Level of collaboration, Restorative capacity, Rerouting, Agility)
Guarnieri and Trojan[28].	Decision making on supplier selection based on social, ethical, and environmental criteria	AHP and ELECTRE-TRI	Economic sustainability: Graphic location, cost, quality, on-time delivery, the efficiency of service, financial stability ,technological capacity, delivery delays, flexibility, productivity and production capacity , technical and organizational capacity, R&D level. Social sustainability: Human rights, philanthropy, public disclosure, certification, management skills ,accordance with the law, continuous improvement, smaller suppliers. Environmental sustainability: Reverse logistics, environmentally friendly packaging, emission, environmental assessment of suppliers, management of hazardous waste, environmental cost, green image, environmental management.
Hosseini et al[25].	Review of quantitative methods for supply chain resilience analysis	Review of quantitative	Absorptive capacity: Geographic distribution, Emergency inventory of manufacturer and backup capacity of the supplier, Multiple sourcing strategies, Maintenance and reliability, Multiple transportation channels. Adaptive capacity: Backup supplier, Rerouting, Communication, Substitution. Restorative Capacity: Budget and resource restoration.
Memari et al[29].	Sustainable supplier selection:	fuzzy TOPSIS	Economic (Cost ,Quality of products,Service performance) Environmental sustainability(Environmental efficiency,Green image, Pollution reduction ,Green competencies) Social sustainability(Safety and health, Employment practices)
Davoudabadi et al[30].	A new integrated weighting and ranking model, considering two aggregation approaches for resilient supplier selection problem.	entropy, DEA and PCA	Pollution control initiatives, Investment in capacity buffers Responsiveness, Capacity for holding strategic inventory stocks for crises.
Abdel-Baset et al. [31].	An integrated neutrosophic method for achieving sustainable	ANP & VIKOR	Economic: Cost of product, revenue on product, transportation cost. Environmental: Trash management, green manufacturing, green packing and labeling

	supplier selection		Social: Vocational health and safety systems, information revelation, ethical issues, and legal compliance
Amindoust[32].	A resilient-sustainable based supplier selection	FIS-DEA	Resilient Criteria(Responsiveness, Risk Reduction, Backup Supplier Contracting, Geographical Segregation, Rerouting, Cooperation, Restorative Capacity, Surplus Inventory) Sustainable Criteria(Green Design Capability, Environmental Management System, Environmental Competencies, Pollution Control, Energy Efficiency, Eco-Design Recycling, Green Research & Development, and Innovation, Work Safety & Labor Health, Social Management Commitment, The Rights of people)
Awasthi et al[33].	Multi-tier sustainable global supplier selection	fuzzy AHP-VIKOR	Economic(Cost ,Quality ,Flexibility ,Speed ,Dependability,Innovativeness) Environmental(Materials, Energy, Water, Biodiversity, Emissions, Effluents and waste, Supplier environmental selection procedure) Social(Labour practices and decent work, Human rights, Society, Product responsibility, Supplier social selection procedure)

Summary of research background

A review of the research literature shows that the field of resilient-sustainable supplier selection is considerably incomplete and insignificant. The lack of a comprehensive model for the resilient-sustainable supplier selection indicates a fundamental gap in studies on the resilient-sustainable supplier model. As mentioned earlier, reviewing the research records did not find a study that examined exactly the model for resilient-sustainable supplier selection. Therefore, considering the importance of this category, the present study has a good innovation in that it deals with a comprehensive model of resilient-sustainable supplier selection.

2.4. Conceptual model

After writing the research design, the theoretical literature was reviewed to identify economic, social, and environmental indicators for evaluating sustainable suppliers as well as absorptive capacity, adaptive capacity, and restorative capacity for evaluating resilient suppliers in Shahid Ghandi Corporation Complex in Yazd, Iran. According to the experts, five indicators were identified for each of the economic, social, and environmental scales of the sustainable supplier evaluation. Also, five indicators were determined for each of the three dimensions of the resilient supplier evaluation, i.e. absorptive capacity, adaptive capacity, and restorative capacity. Then, the first questionnaire was prepared to identify the factor structure of these variables and 10 professors and experts in the field of the supply chain in Shahid Ghandi Corporation Complex evaluated its content validity and selected 30 indicators out of the 126 indicators studied. These 30 indicators constituted the operational dimensions of the resilient-sustainable supplier selection model. The main items of the questionnaire for the low-order latent variables of the model along with the source of the items are summarized in the table below.

Table 1. Resilient-sustainable supplier questionnaire

Dimension	Code	Indicator (item)
Economic (EC)	EC1	Cost (product price, process costs, etc.)
	EC2	Quality (the number of quality assurance certificates such as ISO 9001, defect rate, durability, and product safety)
	EC3	Delivery (the rate of on-time delivery of orders, the time between ordering a product and receiving it (lead time))
	EC4	Financial aspect (the financial ability of the supplier (amount of capital), economic stability, and long-term financial health of the supplier)
	EC5	Technology (the extent of knowledge development and technology capabilities to meet the current and future needs of the company)
Social (SO)	SO1	Safety and health management systems (monitoring the health and safety of employees and taking measures to avoid accidents and protect the safety and health of employees in the supplier company), investment cost, the number of people working in this field, OHSAS 18001 standard
	SO2	Employees' interests and rights (providing basic facilities at work, respect, labor relations, the fair salary of employees in the supplier company)
	SO3	Interests of shareholders and stakeholders (respecting the rights and interests of shareholders, consumers, and the related unions by the supplier company (satisfaction of supplier stakeholders))
	SO4	Social responsibility (a set of duties and responsibilities that the organization should accomplish to maintain the community in which it operates)
	SO5	Influence of local communities (education, supporting educational institutions, economic growth, and prosperity, financial aid, social harms, communication with stakeholders such as local communities and non-governmental organizations)
Environmental (EN)	EN1	Controlling air pollution caused by manufacturing and recycling products (controlling the improper waste disposal and use of hazardous materials in operations, preventing the emission of greenhouse gases and harmful substances, average waste generation, controlling the generation of hazardous and toxic substances)
	EN2	Using eco-friendly and recyclable raw materials (using products that do not harm the environment or are recyclable)
	EN3	Environmental management systems (making environmental commitment and policy, certificates, environmental planning and management, EMS implementation level,

		environmental protection level, ISO 14001 certification
	EN4	Green image (customer's perspective on whether or not the actions and functions of the organization are green)
	EN5	Observing environmental standards and bylaws in the manufacturing and recycling process of products (environmental standards, etc.)
Absorptive (AB)	AB1	Supply chain density (the quantity and geographical distance of nodes in a supply chain or geographical distribution. Manufacturers' collaboration with suppliers that are geographically dispersed increases the risk of disconnection)
	AB2	Manufacturer's emergency inventory and supplier's backup capacity (backup capacity and emergency inventory can reduce SC vulnerability and increase SC flexibility)
	AB3	Multiple sourcing strategies (multiple sourcing strategies is more associated with SCR compared to single sourcing strategy)
	AB4	Capacity and reliability (manufacturers can improve their resilience by cooperating with reliable suppliers with lower disruption rates or the availability in alternative transportation channels in the event of disruption with different features based on costs and delivery date)
	AB5	Multimodal transportation (using multimodal transportation channels can boost SCR against transportation damage)
Adoptive (AD)	AD1	Backup supplier (using a backup supplier in the event of disruption can improve SCR)
	AD2	Routing (changing the direction of freights, especially in multimodal transport systems, can increase SCR in case of damage to the transport mode.
	AD3	Communication (in the event of disruption, lack of information sharing, organization, and collaboration between SC partners can delay the recovery process and reduce SC flexibility)
	AD4	Digital information management (the ability to quickly obtain, store, retrieve, process, and share information about demands, time fluctuations, and price changes, the ability to share location at the time of delivery of raw materials)
	AD5	Agility (the speed at which a company's internal supply chain operations can adapt to changes in the market due to disruptions and thus better respond to unpredicted events)
Restorative (RE)	RE1	Restoring resources (if the resources are restored, improving disruptions needs less time, resulting in higher SC resilience)
	RE2	Restoring budget (if the budget is restored, improving disruptions needs less time, resulting in higher SC resilience)
	RE3	Restoring cyber control (the possibility of restoring and reducing damage due to IT security violation in supply chains, where breaches can disrupt production, cause essential data loss, and compromise information)
	RE4	Information restoration (updating information, etc.)
	RE5	Restoring and redesigning the process (the ability to continuously improve processes, etc.)

In the operational section of the questionnaire, the experts were asked to respond to the items based on the 5-point Likert scale (from very low to very high).

3. Methodology

This research is based on the purpose of application-development type. Because it tries to develop existing models in the field of supplier selection and consider the dimensions of resilience and stability at the same time, it is of a developmental type. On the other hand, because the research results will be used to improve the selection of suppliers in Shahid Ghandi Company, it is practical. In this research, the Delphi method was used to confirm the validity of the dimensions and components, as well as the validation of the model in Shahid Ghandi Company with the method of confirmatory factor analysis, which is reviewed below.

Delphi stage: After identifying the dimensions and components of resilience and sustainability indicators in selecting suppliers from theoretical foundations and previous research by the meta-combined method, the Delphi questionnaire was designed and experts evaluated the importance of the identified components. For this purpose, 10 experts, including university professors and senior managers of Shahid Ghandi Company, were selected and the Delphi questionnaire was distributed among them, and the Delphi process continued until a consensus was reached between them. The method of selecting participants was purposeful. The conditions for academic experts to participate in the research process were to have a doctorate in management and related sciences and to have an article and a book in the field of supplier selection. Also, executive experts had at least 5 years of management experience in Shahid Ghandi Company and at least a master's degree.

Model Validation: To validate the research model, confirmatory factor analysis method and SmartPLS software was used. For this purpose, managers and specialists of Shahid Ghandi Company were polled with a questionnaire. The questionnaire was designed by the researcher at this stage and its validity was confirmed by 5 experts.After identifying indicators, a questionnaire was distributed among the supply chain experts of Shahid Ghandi Corporation Complex and a total of 136 completed questionnaires were gathered. Then, the proposed model was analyzed using CFA and structural equation modeling (SEM).

4. Data analysis using a factor analysis technique

Factor analysis can be divided into two types: exploratory and confirmatory. In exploratory factor analysis (EFA), the researcher seeks to explore the underlying structure of an almost large set of variables, and the initial assumption is that any variable can be associated with any factor. To perform factor analysis, the main steps are as follows, respectively: a) Preparing a correlation matrix from all the variables used in the analysis and estimating the commonality, b) Extracting factors from the correlation matrix c) Selecting and rotating factors (interpretation)

Bartlett’s test was performed to ensure that the data were desirable and, then, Kaiser-Meyer-Olkin (KMO) index was examined, the results of which are shown in Table 2. The KMO index was greater than 0.6 (close to 1) and the significance level of Bartlett’s test was less than 0.05, indicating that the factor analysis was appropriate for identifying the factor structure and model.

Table 2. Bartlett’s test and KMO index

Research questionnaire	KMO test		0.887
	Bartlett’s test	$\chi^{۲}$ value	981.258
		Degrees of freedom (df)	21
		Significance level (Sig.)	0.000

All the data were collected simultaneously from specific individuals using a single tool (questionnaire). Before performing the necessary statistical analyses for testing the hypotheses, Harman's single-factor test was implemented in SPSS to avoid the threat of common method variance (CMV). The CMV exists when a single factor (the 8th factor or the major factor) explains the highest amount of variance (83.142). The principal component analysis and EFA results indicated 30 factors with values of greater than 1, most of which explained 580.8% of the total variance (Table 3), suggesting that the CMV did not threaten the validity of this study.

Table 3. Harman's single-factor test

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.580	28.600	28.600	8.580	28.600	28.600
2	5.706	19.019	47.619	5.706	19.019	47.619
3	2.987	9.956	57.575	2.987	9.956	57.575
4	2.440	8.132	65.707	2.440	8.132	65.707
5	1.514	5.048	70.754	1.514	5.048	70.754
6	1.336	4.454	75.209	1.336	4.454	75.209
7	1.260	4.201	79.410	1.260	4.201	79.410
8	1.120	3.732	83.142	1.120	3.732	83.142
9	.804	2.679	85.821			
10	.725	2.416	88.237			
11	.543	1.808	90.045			
12	.466	1.554	91.600			
13	.411	1.371	92.970			
14	.349	1.164	94.135			
15	.299	.998	95.133			
16	.287	.957	96.090			
17	.230	.767	96.856			
18	.180	.601	97.457			
19	.164	.547	98.004			
20	.156	.518	98.522			
21	.117	.390	98.912			
22	.112	.373	99.285			
23	.066	.220	99.505			
24	.054	.180	99.686			
25	.039	.131	99.817			
26	.027	.090	99.907			
27	.019	.064	99.972			
28	.008	.026	99.998			
29	.001	.002	100.000			
30	-4.754E-16	-1.585E-15	100.000			

Extraction Method: Principal Component Analysis.

The t-value of the questionnaire was greater than 1.96, representing that the correlation between items and variables was significant. In the standard estimation mode, the factor loads were higher than 0.4, indicating that the items were appropriate for the research variables. As can be seen in Table 4, the convergent validity of the studied variables was confirmed. Cronbach's alpha coefficient and composite reliability were calculated to measure the reliability of the questionnaire. For this purpose, the questionnaire was distributed among the 136 experts of the statistical population. According to Table 4, CR and Cronbach's alpha values were greater than 0.7, suggesting that these two parameters were established for all the variables.

Table 4. Cronbach's alpha coefficient, composite reliability, and convergent validity

Variables	AVE	CR	Cronbach's alpha
resilient-sustainable supplier	0.61	0.87	0.92
Economic	0.59	0.94	0.90
Social	0.55	0.75	0.88
Environmental	0.52	0.82	.85
Absorptive capacity	0.50	0.77	0.79
Adaptive capacity	0.48	0.75	0.77
Restorative Capacity	0.47	0.90	.93

Table 5. Evaluation of diagnostic validity

Variables	1	2	3	4	5	6	7
resilient-sustainable supplier	0.61						
Economic	0.59	0.59					
Social	0.58	0.57	0.55				
Environmental	0.56	0.55	0.53	0.52			
Absorptive capacity	0.55	0.52	0.51	0.51	0.50		
Adaptive capacity	0.47	0.50	0.50	0.48	0.56	0.48	
Restorative Capacity	0.44	0.46	0.48	0.46	0.54	0.46	0.47

As can be seen in Table 5, the square root of AVE of each construct (principal diagonal of the matrix) was greater than the correlation coefficient of that construct with other constructs, supporting that the divergent validity of the constructs was acceptable.

4.1. Data analysis by SEM

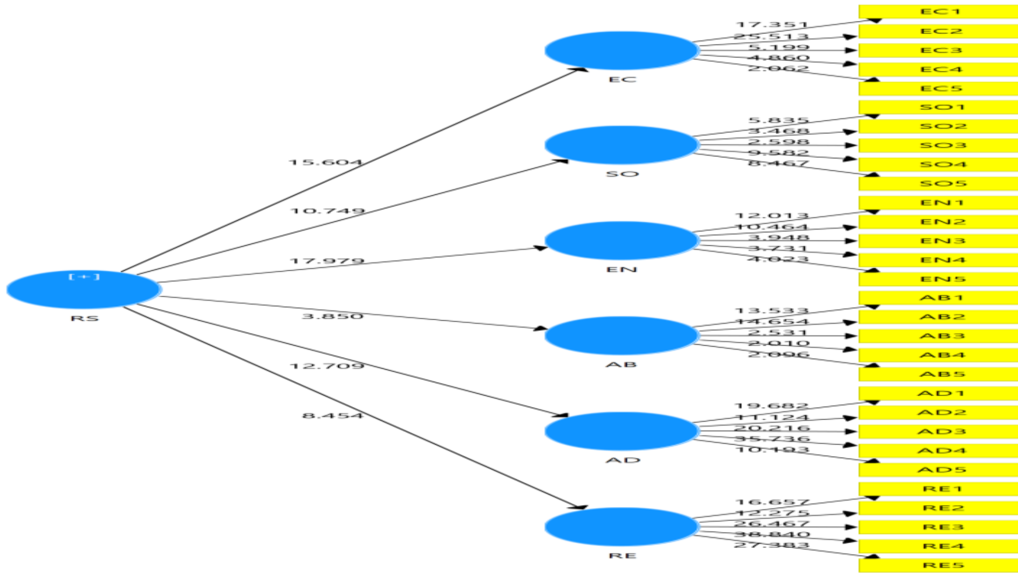

Fig. 1. P-values obtained from SEM of research hypotheses

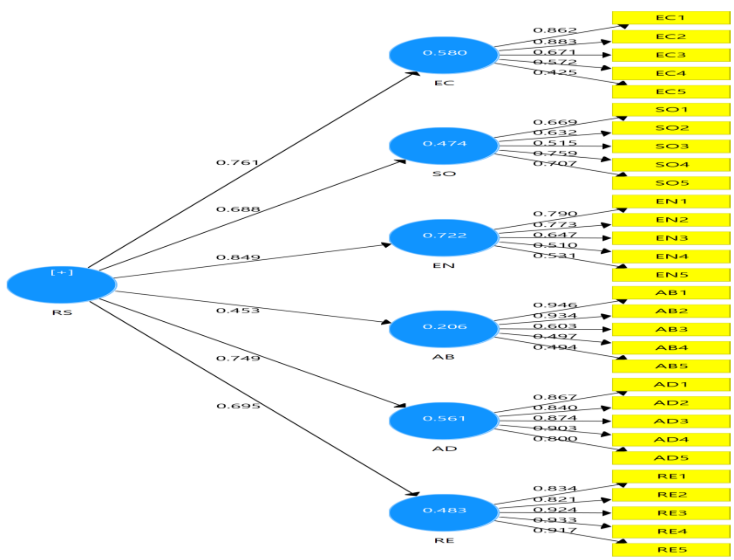

Fig. 2. Standardized coefficients obtained from SEM of research hypotheses

Based on the CFA results using PLS software, P-values presented in Fig. 1 indicate that all the correlations were significant. Also, the table below shows the factor load and P-values.

Table 6. Evaluating the factor loads of the questionnaire

Item	Factor load	t	Item	Factor load	t
EC1	۰.۸۶۲	۱۷.۳۵۱	AB1	۰.۹۴۶	۱۳.۵۳۳
EC2	۰.۸۸۳	۲۵.۵۱۳	AB2	۰.۹۳۴	۱۴.۶۵۴
EC3	۰.۶۷۱	۵.۱۹۹	AB3	۰.۶۰۳	۲.۵۳۱
EC4	۰.۵۷۲	۴.۸۶۰	AB4	۰.۴۹۷	۲.۰۱۰
EC5	۰.۴۲۵	۲.۰۶۲	AB5	۰.۴۹۴	۲.۰۹۶
SO1	۰.۶۶۹	۵.۸۳۵	AD1	۰.۸۶۷	۱۹.۶۸۲
SO2	۰.۶۳۲	۳.۴۶۸	AD2	۰.۸۴۰	۱۱.۱۲۴
SO3	۰.۵۱۵	۲.۵۹۸	AD3	۰.۸۷۴	۲۰.۲۱۶
SO4	۰.۷۵۹	۹.۵۸۲	AD4	۰.۹۰۳	۳۵.۷۳۶
SO5	۰.۷۰۷	۸.۴۶۷	AD5	۰.۸۰۰	۱۰.۱۹۳
EN1	۰.۷۹۰	۱۲.۰۱۳	RE1	۰.۸۳۴	۱۶.۶۵۷
EN2	۰.۷۷۳	۱۰.۴۶۴	RE2	۰.۸۲۱	۱۲.۲۷۵
EN3	۰.۶۴۷	۳.۹۴۸	RE3	۰.۹۲۴	۲۶.۴۶۷
EN4	۰.۵۱۰	۳.۷۳۱	RE4	۰.۹۳۳	۳۸.۸۴۰
EN5	۰.۵۳۱	۴.۰۲۳	RE5	۰.۹۱۷	۲۷.۳۸۳

According to Fig. 2, dimensions of the resilient-sustainable supplier selection were prioritized as follows: environmental dimension with a factor load of 0.849, economic dimension with a factor load of 0.761, adaptive capacity with a factor load of 0.749, restorative capacity with a factor load of 0.695, social dimension with a factor load of 0.688, and absorptive capacity with a factor load of 0.453. The most important items in economic, social, environmental, absorptive capacity, adaptive capacity, and restorative capacity dimensions were quality (with code EC2 and a factor load of 0.883), social responsibility (with code SO4 and a factor load of 0.759), controlling air pollution caused by manufacturing and recycling products (with code EN1 and a factor load of 0.790), supply chain density (with code AB1 and a factor load of 0.946), digital information management (with code AD4 and a factor load of 0.903), and information restoration (with code RE4 and a factor load of 0.933), respectively.

5. Conclusion and Recommendations

This study aimed to present a resilient-sustainable supplier selection model in Shahid Ghandi Corporation Complex, Yazd, Iran. After reviewing the literature and identifying the research variables, six factors were found to be effective in selecting the resilient-sustainable supplier model. The results showed that the variables were prioritized as economic, environmental, adaptive capacity, restorative capacity, social, and absorption capacity, respectively. The results of this study were almost in line with the results of some other studies.Based on the results, the most important factor for choosing a resilient-sustainable supplier is the economic factor. As the results show, in Shahid Ghandi Company, economic stability plays an important role in selecting suppliers. Extensive and basic economic growth and long-term development are to be considered, the results of Ghadimi and Heavey(2014) are in line with this research.Secondary environmental sustainability plays an important role in supplier selection, indicating that biodiversity, climate stability, and other ecosystem functions, which are not normally classified as economic resources, should also be supported. The results of Ghadimi and Heavey(2014) are consistent with this research.Adaptive capacity comes next, which is defined as the ability of a system to adapt to itself and try to deal with negative consequences or potential harm. This is part of a post-disaster strategy, also known as "response capacity". Hosseini et al. (2019) concluded that a system with appropriate adaptive power can respond positively to disturbances.

Considering that the supply of raw materials is very important in Shahid Ghandi Company and some of these items such as optical fiber in telecommunication cables are supplied from foreign suppliers, one of the main concerns of this company has always been the supply of production raw materials. Even now, this importance has become much greater due to various risks. On the other hand, sustainability issues have always been one of the most important issues for company managers concerning suppliers. The results of the present study can provide a scientific and operational model for the managers of Shahid Ghandi Company who, in addition to reducing their risks with suppliers, also follow sustainability issues and alleviate their concerns to a large extent.

The supplier should control and reduce air pollutant emissions to improve the level of the environmental indicator. Also, more attention should be paid to material recycling. Suppliers should increase the number of their quality certificates to improve the quality of their products. They also need to increase their trust in supply chains to improve communication. The main limitation of the study was that the resilient-sustainable supplier selection varies in different industries, so the obtained factors may not be generalizable to all industries. Therefore, this model is recommended to be tested in other industries in future studies. In this paper, MADM methods will be used to rank suppliers, and order allocation will be done using goal programming (GP).

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