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Research Paper

Supplier's Selection Based on Lean-Green Production Indicators by Goal Programming, Fuzzy DEMATEL and Fuzzy Quality Function Development

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Abstract **One of the most important parts of the green supply chain management (GSCM) is the green supplier. The green supplier selection process has a vague nature. Therefore, specific approaches, such as fuzzy, are necessary during their evaluation. On the other hand, the choice of a coherent and integrated strategy is vital to achieve lean and green production. Accordingly, the present study aimed to select suppliers based on lean green production indicators by goal programming, fuzzy DEMATEL and quality performance expansion. The statistical population of this study consisted of personnel (managers, assistants and experts) with 16 managers and assistants and 46 experts. In this research, the Cochran formula (including error percentage of 5%) was used to determine the number of statistical samples. Accordingly, 53 experts from Pars Khodro Company participated as a sample (by simple random sampling method). In order to analyze the data, fuzzy DEMATEL methods, expansion of fuzzy performance quality and goal programming were used. According to the findings of the present study, continuous improvement to achieve lean green indicators is the main element of the production system at Pars Khodro Company. The important aspect of determining how much damage would be bestowed on the best supplier, so that it would be possible to determine the least amount of damage in sum, was reviewed in this section. In other**

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words, the lowest possible losses are based on the suffering of the current losses, the supplier and in which level of losses it has the most optimal status.

Keywords *Lean Green Production; Goal Programming; Supplier Selection; Fuzzy Quality Function Development*

Introduction

Wildly, the main objective of supply chain management (SCM) is to minimize the costs, which have ignored the environmental concerns. But today, organizations as well as suppliers are very concerned about green indicators (Humphreys et al., 2003). Green Supply Chain Management (GSCM) is an emerging trend that organizations are expanding to address environmental concerns, such as carbon emissions (Fallahpour et al., 2017). Green supply chain management focuses on striking a balance between environmental, social and economic aspects, which includes the traditional definition of supply chain management, namely the conversion of raw materials to consumer goods, including the flow of goods and information for end users (pour et al., 2011). One of the most important parts of the Green Supply Chain Management is the Green supplier (Blome et al., 2014). The green supplier selection process has a vague nature. Therefore, specific approaches such as fuzzy are necessary during their evaluation (Kazemi et al., 2016). According to Sanayei et al. (2008), one of the complex multiple indicators problem, which includes qualitative factors as well as quantitative factors is supplier selection problem. The exchange of factors is crucial for selecting the best suppliers. Demirtas & Ozden (2008) divided the supplier selection problem into two types, including finding exclusive sources and finding multiple sources. In finding exclusive sources, a supplier meets all buyer demands, while in finding multiple sources; all the requirements and conditions of the buyer cannot be met through an exclusive supplier. Supplier selection is a very important step in supply chain management, a decision problem with multiple indicators that includes factors such as quality, time and cost. Operational research plays a vital role in selecting suppliers. This streamlines of the flow of purchasing decisions, such as decision clarity, in various ways and even more efficiently (De Boer et al., 2001). Choosing a supplier and allocating orders is an issue to choose the supplier (s) from a number of available suppliers and assign the expected order to them (Weber & Current, 1993). In this regard, in order to select the best suppliers and allocate orders, some decision techniques such as targeted planning, linear programming, and mix integer have been applied (Basnet & Leung, 2005).Sanayei et al. (2008) ranked and allocated the orders to different suppliers by combining the combining multi-attribute utility theory and linear programming. Ha & Krishnan (2008) Explained that improving the final outcome of supplier selection can be achieved by combining a model with others. Demirtas & Ozden (2008) Considered tangible, intangible factors and integrated linear integer programming and network analysis process to find suitable suppliers that can increase the overall value of the purchasing process in this regard. The -ε method is used to solve problems with multiple objects. To evaluate the performance of some suppliers based on multiple indicators, some methods, including analytic hierarchy process (AHP) and multiple ranking methods have been used (Ho et al., 2010). Mafakheri etal. (2011) used dynamic planning in two steps to select the supplier and allocate the orders. They used analytic hierarchy process in the first phase and then maximized the performance utility (Babar & Amin, 2018). A set of suppliers are selected in supplier selection process. The evaluation is not easy on the basis of qualitative and quantitative suppliers. A review of different selection methods has been published by De Boer et al. (2001). The idea that a modest supply chain is a lot dependent on the supplier selection is still on the top. To ensure that all needs are given appropriate importance, the multiple indicators techniques are effective (Liao & Rittscher, 2007). Several authors have used quality function development to select the supplier. However, most of them used quality function development only in one step. As a result, some connections between indicators have been ignored. On the other hand, triangular fuzzy numbers have been seen to be used in many fuzzy supplier selection papers, but better results can be obtained by using trapezoidal fuzzy numbers. In the literature of supplier selection, many authors have used a single method to solve multiple purpose issues, but developing and implementing more methods to provide efficient solutions for decision makers is more valuable (Babar & Amin, 2018). However, studies have shown that using trapezoidal fuzzy numbers can be more flexible than triangle numbers, and it is more efficient to solve uncertainties and ambiguities in solving mathematical problems (chen, 2003). In addition, most articles resolve supplier selection problems and assume that this trend is a period and a single product that may not provide comprehensive results. These are some of the points that have been ignored in this context and by authors in other papers, so in order to correct them, a mathematical model must be developed to select a set of suppliers and determine their order quantity (Babar & Amin, 2018). This model has been recently proposed in the Babar & Amin (2018) study, which consists of two steps: firstly, a two-stage quality function development model as a new and innovative approach in determining supplier's weight and ranking them is expanded and developed. In the second step, the order quantity is determined by a multi-objective model. It is worth noting that proper supplier selection in the context of environmental concerns requires determining appropriate indicators in this area such as Lean-Green Indicators. Today, reducing waste and its costs, along with the reduction of environmental hazards in production is considered to be important, which is followed up in two areas, namely lean production and green production (Cherrafi et al., 2018).Protecting the environment and ensuring the sustainability and comprehensiveness of its development is the most serious challenge facing the international community (Vallaei, 2005).With increasing severity and the number of threats and environmental hazards over the last three decades, environmental concerns have grown to a degree where environmental crises have been found to be objective embodiments (Azimi & Gholami, 2012). The appropriate use of the environment in the country can be a guarantor of durability, and the lack of attention towards it can entail issues that put the set of economic, social, cultural and political development programs in country at risk. Hence, a proper understanding of the role of deterrent factors and their reduction in terms of strengthening incentive factors can lead to success in protecting environmental (Havvey, 2010). One of these deterrent factors is the proper recognition of production systems that are consistent with lean-green production. In other words, by carefully examining and matching the indicators of the company's specific production systems with the lean-green indicators, we can provide the necessary context for the operation of this principle (Kurdve et al., 2014).Lean production system is a kind of production system that uses the benefits of mass production and custom production (manual), and is designed to help reducing waste, which its goal is to eliminate non-value added activities. The main philosophy of this productive system is to perfect the production systems (Davari, 2009). In recent years, plans which have been considered for developing effective lean production systems have been implemented in many leading companies in the world. In many cases, this has been very successful in increasing productivity, reducing costs, improving customer response time and helping quality, more profitability and improving public image (Liker, 2004). On the other hand, by rising environmental concerns and the effects of companies on environment, issues such as environmental management and green production have been raised. (Fazlzadeh et al., 2014). Green production seeks to reduce the environmental impacts of business processes (Ninlawan, 2010). A number of research efforts show that lean companies demonstrate significant environmental improvements with higher resource and energy efficiency. Some studies also show how lean and green systems share many of the best practices to reduce relevant waste products. However, the glimpse is that these two systems tend to be independent, managed by different and distinct personnel, even in a production company, while the two systems have a common point in different parts and can be done in a single system without parallel activities (Kurdve, 2014). Failure to integrate these two systems produces additional costs to the organization, with two separate workgroups, and on the other hand, programs that run in parallel on both systems, given the different viewpoints of the work team managers can have different situations, that can lead to negative outcomes due to the lack of utilization of a single management (Pampanelli et al., 2014).However, according to Kurdve's (2014) view, there is also a research vacuum in this area, and studies are partly about examining parts of their common point. Accordingly, it is not possible to see a comprehensive model that integrates lean and green production. Accordingly, in the first place, it should be noted that which characteristics and indicators each of the lean and green production systems have, and in which of these cases they have common points. Secondly, by using correct computational methods, we must determine how to achieve and operationalize an integrated lean and green production system. One of the most widely used and useful methods that can correctly determine the relevance of the necessary requirements to achieve some of the goals is the quality function development method. Quality Function Development (QFD) is a useful tool for converting defined demands to existing specifications, as well as deciding when to consider a set of issues simultaneously with their requirements in decision making. Quality function development method is a structured process that is constructed of multiple matrix and can consider multiple objectives (Zaim & Sevkli, 2002). However, the use of definite numbers has always influenced the accuracy of the results obtained from experts' opinions, and based on this; accordingly fuzzy logic has been increasingly used to improve the performance of math techniques and the accuracy of expert’s opinions in various ways (Zadeh, 1988). Also fuzzy Quality Function Development (Fuzzy QFD) is a method that, given the adaptation of the expert's view of linguistic variables to describe an issue with an abstract concept, has had a more favorable performance than the previous one (Hoo & Ho, 1996). On the other hand, in order to improve the performance of Quality Function Development technique, it is necessary to use more appropriate methods in some parts of its process, which is referred to as fuzzy DAMTEL and when these two methods are combined, they are called DEMATEL-QFD (Dursun & Şener, 2014).Accordingly, it is possible to use quality function development and fuzzy DEMATEL methods with the elimination of uncertainties and achieving an efficient method to determine the requirements to achieve an integrated system of lean and green production system. It is worth noting that Pars Khodro has faced the parallel activity issues of lean and green production systems in order to improve its performance and management more appropriately in lean and green production systems of the company and in order to improve the performance and to eliminate the additional and parallel processes, it seeks to achieve an integrated system of lean and green production systems, but it is not worth mentioning in a study that has fully described the common points between the two systems and has been neglected in other studies.On the other hand, after this step, it is important to know, how to link engineering requirements for the realization of lean-green production system, using the correct method. Finally, by identifying the most important requirements, it is possible to select the suppliers by using goal programming.The main contribution of this paper is :

- Determining the common points of lean and green production system indicators, called Lean Green Production System (LGPS);
- Determining the internal Relationships among engineering requirements in the production system indicators by using fuzzy DEMATEL method;
- Prioritizing each of the necessary requirements to achieve LGPS by using fuzzy quality function development;
- Selecting suppliers based on goal programming with the focus on lean-green production indicators.

The main contribution of this paper is to propose a new mathematical model to select supplier by goal programming. This paper is an exploration research to identify main factors in LGPS. In the first step, indicators related to lean green production system (LGPS) were identified with the opinion of industry experts. Then, cause and effect relation between LGPS factors are considered by researchers. Finally, we used AHP to prioritized factors in uncertain condition.

Literature Review

In this section, lean-green indicators are based on the combination of indicators which have common points in lean and green production (Table. 1). It is worth noting that " Production Lean " is a term that researcher John Grafisc from International Motor Program Vehicle, has introduced, so it is called "lean", which compared with mass production, everything is used to a lesser extent (Pak Maram & Rostam nezhad, 2015). Following the compressive production, the age of lean production arose. The underlying principles of lean philosophy are based on minimizing all kinds of losses and increasing the quality of products. Recycling was recognized as the worst kind of loss and "quality in the first course" was considered as one of the first measures of pure production. Rework was recognized as the worst kind of loss and "quality in the first course" was considered as one of the first measures of lean production (Wendy, 2012).Green production is defined as production processes that use inputs with relatively low environmental impacts, high efficiency, as well as waste, or less pollution (Ninlawan, 2010).

Table 1

Lean-green Production Indicators

Lean Green Indicators (resulting from common points of lean production and green production)	
Zhu et al (2008); Kotzab et al (2011); Trowbridg (2006); Ninlawan (2010); Ahmadi et al (2013); Imani and Ahmadi (2009); Anvari and Aghdashi (2008); Zamani and Heydari (2011); McCright and Bergmiller (2009).	suitable packaging
Trowbridg (2006); Rao (2006); Jasiulewicz (2014); pour zamani and mashayekhi fard (2015); Ninlawan (2010); Heydari and Zamani (2001); Seyyed hosseini and bayat turk (2005); Fazl zadeh and Marabdian hagh (2014); Soriano- Meier & Forrester (2004); McCright and Bergmiller (2009).	waste reduction
Rao (2006); pour zamani and mashayekhi fard (2015); Powell et al (2013); Lang (2010); Pak maram and Rostam nezhad (2015); Shafiee and Mirghafoori (2011); Florida (1996).	quality improvement
) 2015 (pour zamani and mashayekhi fard ;)2006 (Rao) 2008 (Morad zadeh ;)2010 (Ninlawan ;)2007 (Montabon) 2009 (Imani and Ahmadi ;)2011 (Nik nezhad) 2014 (Jalali ;)2015 (Heydar pour and Gharni	Reducing environmental pollution
Morad zadeh (2008); Ninlawan (2010); Imani and Ahmadi (2009); Meier & Forrester (2006); Seyyed hosseini and bayat tork (2005); Womack (2000).	Transportation Management

Duber-Smith (2005); Heydar pour and Gharni (2015); Lang (2010); Karami pour et al (2014); Powell et al (2013); Shafiee and Mirghafoori (2011); Taji et al (2013); Anvari and Aghdashi (2008); Florida (1996); Womack (2000).	cost reduction
Nik nezhad (2011); Montabon (2007); Duber-Smith (2005); Karami pour et al (2014); Florida (1996); Jasiulewicz (2014); MacDuffie (2005); Pak maram and Rostam nezhad (2015); Shafiee and Mirghafoori (2011); Meier & Forrester (2002); McCright and Bergmiller (2009); Taji et al (2013); Womack (2000).	Increased production and productivity

On this basis, a lean-green production system, which is in fact a combination of lean production and green production, can be categorized into 6 main categories or 6 general indicators: suitable packaging; waste reduction; quality improvement; reducing environmental pollution; transportation management; cost reduction; increased production and productivity.

Today, companies are trying to develop, compile and copy the instructions to know how to achieve the best operational design in production and exploit it (Laugen et al., 2005). In fact, they are in many cases proportional to the selection of best practices in recovery programs, which are introduced in the form of the same models of the company-specific production systems, and are referred to as XPS (Netland, 2013). On this basis, XPSs can be thought of as a set of procedures and guidelines that are tailored to any particular company and are used to achieve the best practices and improve operational performance. It should be noted that since there is no consensus on the elements of an XPS, different companies use different XPSs. Based on the explanations of researchers in describing TPS and XPS (Jayaram et al., 2010; Netland, 2013; Liker, 2009 and stalberg, 2012), the six main elements in an XPS can be mentioned:

Table 2

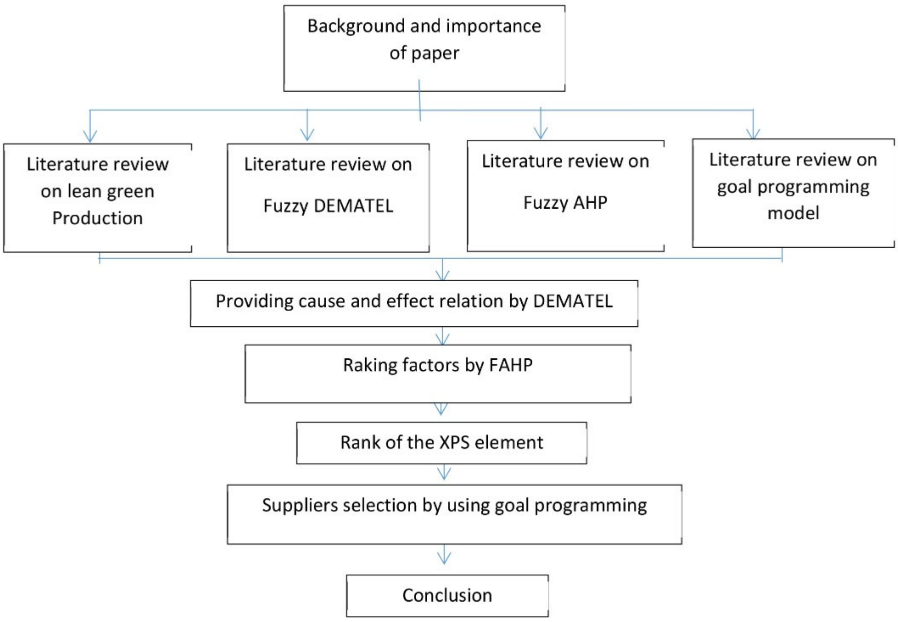
Six Main Elements in a Production System

The Main Element in XPS	Researcher (Year)
Values and vision	(2014) Kurdve et al
Principles	Blücher and Öjmertz (2008) Netland (2013)
Tools, methods and techniques	(2014) Kurdve et al
Key performance indicators	Kurdve and Daghini (2012) Jayaram et al. (2010)
Organization	Magnusson et al. (2003)
auditing system	Harlin et al. (2008)

The DEMATEL (Decision Making Trial and Evaluation Laboratory) strategy, created by the Science and Human Affairs Program of the Battelle Memorial Institute of Geneva somewhere in the range of 1972 and 1976, was utilized to explore and tackle convoluted and entwined issue bunches (Fontela, 1976). The pertinence of the DEMATEL technique is far and wide, extending from examining world problematique dynamic to modern arranging (Tzeng et al., 2006). The most significant property of the DEMATEL strategy utilized in 790 L. Chung & Gwo believe that the multi-rules dynamic (MCDM) field is to develop interrelations between rules. After the interrelations between rules were resolved, the outcomes.Gotten from the DEMATEL strategy could be utilized for fluffy integrals to gauge the super-added substance adequacy esteem or for the Analytic Network Process strategy (ANP)(Liou et al.,2008). To measure reliance and input connections between criteria- criteria. There are four stages in the DEMATEL strategy: (1) compute the normal framework; (2) figure the standardized beginning direct-impact framework; (3) determine the absolute connection lattice; and (4) set a limit esteem and acquire the effect relations map. In Step 4, proper edge esteem is important to get a reasonable effect relations map just as sufficient data for additional investigation and dynamic. The conventional technique followed to set a limit esteem is directing conversations with specialists. The after reflects of the edge esteems may contrast among various specialists (Wei & Hshiung,2009).

Figuer 1

The Framework of the Paper



Reseach Methodology

The kind of this study is practical and exploration (according to the possibility of using it for flexible suppliers selection based on different timeframes with qualitative and quantitative indicators and ordering based on lean-green indicators) and its research method is descriptive and developmental. In this way, in the present study by using two models of quality function development and multi-objective planning, we proposed a new model for supplier selection with the focus on environmental indicators. The statistical population of this study was personnel (managers, assistants and experts), quality control units, HSE unit, design and program unit, financial and economic unit, support and supply, research and development department, administrative and trade department of the company with 16 managers, assistants and 46 experts. In this research, Cochran formula was used to determine the number of statistical samples. Accordingly, 53 experts from Pars Khodro Company participated in this paper as a sample (by simple random sampling method). In order to analyze the data, goal programming, fuzzy DEMATEL and fuzzy quality function development were used.The current research is devoted to the development of a conceptual model for LGPS evaluation using DEMATEL. The model is aimed to help companies and supply chain managers to adapt to uncertainties and complexities in the real world, and to find a suitable tool for evaluating and controlling the lean – green suppliers through different approaches. The lean green supplier evaluation methodology proposed in this study has three main steps: 1. establishing and analyzing criteria for supplier evaluation using experts' opinions with NGT. The expert panel consists of sixteen managers and directors of environmental and supply chain departments from Pars Khodro Company. In this step, the evaluation criteria for lean green suppliers will be collected through literature review and discussion with managers and eco-experts. 2. Modeling DEMATEL for supplier performance evaluation in lean green supply chain context. In this step, DEMATEL for lean green supplier evaluation will be designed and insights into the method with some sensitivity analysis will be provided. 3. Validation of the model: a case study in Pars

Khodro will be carried out to validate the new lean green supplier evaluation method. Due to the complexity of the decision-making process involved in lean green supplier evaluation, several aforementioned literature relied on some form of procedures that assign weights to various performance measures (Talaei-Khoei et al. 2012).Our review shows that although some mathematical programming approaches based on multi-criteria decision making methods have been used for the lean green supplier evaluation in different studies, they have a main weakness which is their inability to include interrelationships within the criteria in the model.The aim of this paper is to find out the interrelationship of the lean green supplier evaluation aspects using DEMATEL, FAHP and GP mathematical model.Goal programming (GP) is a branch of multi objective optimization, which in turn is a branch of multi-criteria decision analysis (MCDA). It can be thought of as an extension or generalization of linear programming to handle multiple, normally conflicting objective measures. Each of these measures is given a goal or target value to be achieved. Deviations are measured from these goals both above and below the target. Unwanted deviations from this set of target values are then minimized in an achievement function. This can be a vector or a weighted sum dependent on the goal programming variant used. As satisfaction of the target is deemed to satisfy the decision maker(s), an underlying satisficing philosophy is assumed. Goal programming is used to perform three types of analysis:

Determine the required resources to achieve a desired set of objectives;

Determine the degree of attainment of the goals with the available resources;

Providing the best satisfying solution under a varying amount of resources and priorities of the goals.

Findings

According to the review of the seven indicators, six lean green indicators were approved as the expected indicators for Pars Khodro Company. The results obtained in this section are presented in table (3) (according to the normal distribution of data, T-test of one sample has been used, and the significance level of the K-S test is also presented in the table below):

Table 3

T-Test of one Sample in Lean-green Indicators - Test Value = 3-(n =52)

KS	Average Difference	Significance level	Degrees of Freedom	T	Average	
0.212	1.358	.000	52	11.855	4.36	quality Improvement
0.123	1.075	.000	52	8.541	4.08	cost reduction
0.122	.925	.000	52	7.180	3.92	Reducing environmental pollution
0.123	.868	.000	52	6.085	3.87	waste reduction
0.245	.528	.000	52	4.219	3.53	Reduction of additional transportation
0.423	.547	.000	52	4.017	3.55	suitable packaging
0.089	-.423	.005	51	-2.946	2.58	Increased production and productivity

According to the results, it can be seen that in accordance with the views of the managers, assistants and experts of Pars Khodro Company, The average of six indicators of quality improvement, cost reduction, reduction of environmental pollution, waste reduction, reduction of additional transportation is higher than 3, which is confirmed statistically ($P < 0.01$).In order to prioritize lean-green indicators and their debt weight (for using in FQFD method), the fuzzy hierarchy analysis system was used. The calculations performed to determine the priority of lean-green indicators are as follows (Table 4).

Table 4

Defuzzification of Normalized Weights of Lean-green Indicators by Using Bojadziev's Method (2007)

Determining the options by using Bojadziev level center method	X1max	X2max	X3max	Defuzzy of Bojadziev	**Variable**	**The final weight**
	0.020	0.020	0.019	0.020	X1	0.033
	0.036	0.035	0.034	0.036	X2	0.058
	0.231	0.228	0.224	0.231	X3	0.375
	0.116	0.113	0.111	0.116	X4	0.187
	0.060	0.058	0.057	0.060	X5	0.097
	0.155	0.152	0.150	0.155	X6	0.251

Also, by using expert choice software, the incompatible rate of 0.08 was reported. In general, according to the findings of the present research, prioritizing the lean-green indicators using the Fuzzy. AHP method is as follows: 1-Quality improvement; 2- cost reduction; 3-reduction of environmental pollution; 4- waste reduction; 5- reduction of additional transportation and 6- suitable packaging. In following, the results of determining the correlation between XPSs using Fuzzy DEMATEL are presented.

In Fuzzy DEMATEL method matrices based on fuzzy numbers, are used. In these matrices, fuzzy numbers are triangular and $\tilde{x}_{ii} = (i = 1,2,3, \ldots, n)$are considered as fuzzy numbers (0, 0, 0). In order to consider the opinion of all experts according to formula (1), arithmetic average is taken.

$$\tilde{z} = \frac{\tilde{x}^1 \oplus \tilde{x}^2 \oplus \tilde{x}^3 \oplus \ldots \oplus x^p}{p} \qquad (1)$$

In this formula p is the number of experts and $\tilde{x}^1$, $\tilde{x}^2$, $\tilde{x}^p$ are respectively the pair comparison matrix expert 1, expert 2 and expert p, and z is a triangular fuzzy number as $\tilde{z}_{ij} = (l'_{ij}, m'_{ij}, u'_{ij})$. In Table (5), the fuzzy average of expert opinions on the impact of XPS indicators on each other is shown.

Table 5

Average fuzzy Number of Experts' Opinions on the Effect of Production System Indicators on Each Other

*	A			B			C			D			E			F			G			H			I			J			K			L			M			N			O		
A	0.0	0.0	0.0	1.0	1.0	1.0	7.7	8.7	8.9	5.4	6.4	7.4	7.7	8.7	8.9	1.1	1.3	1.4	3.7	4.7	5.7	1.1	1.3	1.4	5.4	6.4	7.4	4.3	5.3	6.3	2.3	3.3	4.3	1.1	1.3	1.4	2.3	3.3	4.3	7.7	8.7	8.9	5.7	6.7	7.7
B	4.3	5.3	6.3	0.0	0.0	0.0	5.7	6.7	7.7	5.7	6.7	7.7	4.3	5.3	6.3	1.0	1.0	1.0	7.7	8.7	8.9	7.7	8.7	8.9	7.7	8.7	8.9	4.3	5.3	6.3	7.7	8.7	8.9	1.0	1.0	1.0	7.7	8.7	8.9	2.3	3.3	4.3	5.7	6.7	7.7
C	7.1	8.1	8.6	5.7	6.7	7.7	0.0	0.0	0.0	7.7	8.7	8.9	5.7	6.7	7.7	2.3	3.3	4.3	4.3	5.3	6.3	4.3	5.3	6.3	4.3	5.3	6.3	5.7	6.7	7.7	2.3	3.3	4.3	5.7	6.7	7.7	2.3	3.3	4.3	5.7	6.7	7.7	4.3	5.3	6.3
D	5.1	6.1	7.1	3.1	4.1	5.1	5.7	6.7	7.7	0.0	0.0	0.0	6.3	7.3	8.1	6.3	7.3	8.1	7.7	8.7	8.9	3.7	4.7	5.7	4.3	5.3	6.3	7.7	8.7	8.9	4.3	5.3	6.3	2.3	3.3	4.3	2.3	3.3	4.3	5.7	6.7	7.7	6.3	7.3	8.1
E	7.1	8.1	8.6	3.7	4.7	5.7	7.7	8.7	8.9	7.4	8.4	8.6	0.0	0.0	0.0	1.0	1.0	1.0	2.3	3.3	4.3	2.3	3.3	4.3	6.3	7.3	8.1	6.3	7.3	8.1	2.3	3.3	4.3	1.1	1.3	1.4	1.1	1.3	1.4	1.0	1.0	1.0	4.3	5.3	6.3
F	3.1	4.1	5.1	4.9	5.9	6.9	4.3	5.3	6.3	6.3	7.3	8.1	3.4	4.4	5.4	0.0	0.0	0.0	2.3	3.3	4.3	2.3	3.3	4.3	2.3	3.3	4.3	5.7	6.7	7.7	2.3	3.3	4.3	2.3	3.3	4.3	1.1	1.3	1.4	1.0	1.0	1.0	2.3	3.3	4.3
G	2.9	3.9	4.9	7.7	8.7	8.9	3.7	4.7	5.7	6.3	7.3	8.1	2.6	3.6	4.6	1.0	1.0	1.0	0.0	0.0	0.0	7.7	8.7	8.9	4.3	5.3	6.3	6.3	7.3	8.1	7.7	8.7	8.9	1.0	1.0	1.0	7.4	8.4	8.7	2.3	3.3	4.3	5.9	6.9	7.9
H	1.4	1.9	2.3	5.7	6.7	7.3	3.4	4.4	5.4	3.4	4.4	5.4	2.6	3.6	4.6	2.6	3.6	4.6	7.4	8.4	8.7	0.0	0.0	0.0	6.3	7.3	8.1	3.1	4.1	5.1	5.4	6.7	7.3	2.3	1.9	2.1	7.7	8.7	8.9	1.1	1.3	1.4	3.7	4.7	5.7
I	5.1	6.1	7.1	6.9	7.9	8.4	3.7	4.7	5.7	2.3	3.3	4.3	3.4	4.4	5.4	1.0	1.0	1.0	3.7	4.7	5.7	3.7	4.7	5.7	0.0	0.0	0.0	4.3	5.3	6.3	4.3	5.3	6.3	1.4	1.6	1.7	2.3	3.3	4.3	2.3	3.3	4.3	7.7	8.7	8.9
J	7.1	8.1	8.6	5.1	5.9	6.9	3.7	4.7	5.7	7.7	8.7	8.9	5.4	6.4	7.4	3.7	4.7	5.7	6.3	7.3	8.1	2.3	3.3	4.3	5.7	6.7	7.7	0.0	0.0	0.0	2.3	3.3	4.3	2.3	3.3	4.3	1.1	2.1	3.1	3.7	4.7	5.7	7.4	8.4	8.7
K	3.7	4.7	5.9	7.1	8.1	8.6	2.3	3.3	4.3	2.3	3.3	4.3	2.6	3.6	4.6	1.1	1.3	1.4	7.7	8.7	8.9	7.7	8.7	8.9	5.7	6.7	7.7	4.3	5.3	6.3	0.0	0.0	0.0	1.0	1.0	1.0	7.7	8.7	8.9	5.7	6.7	7.7	7.7	8.7	8.9
L	1.1	1.3	1.4	1.4	1.9	2.3	7.7	8.7	8.9	2.3	3.3	4.3	1.3	1.6	1.9	7.7	8.7	8.9	2.3	3.3	4.3	1.1	1.3	1.4	1.0	1.0	1.0	2.3	3.3	4.3	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M	2.4	3.4	4.4	7.7	8.7	8.9	4.3	5.3	6.3	2.3	3.3	4.3	2.6	3.6	4.6	2.3	3.3	4.3	7.7	8.7	8.9	7.7	8.7	8.9	4.3	5.3	6.3	2.3	3.3	4.3	7.7	8.7	8.9	1.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0	6.3	7.3	8.1
N	7.7	8.7	8.9	2.1	3.1	4.1	7.7	8.7	8.9	6.3	7.3	8.1	7.4	8.4	8.7	2.3	3.3	4.3	2.3	3.3	4.3	2.3	3.3	4.3	7.7	8.7	8.9	4.3	5.3	6.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	7.1	8.1	8.3
O	7.7	8.7	8.9	7.1	8.1	8.6	3.7	4.7	5.7	3.7	4.7	5.7	7.4	8.4	8.6	2.3	3.3	4.3	5.9	6.9	7.6	7.4	8.4	8.7	7.4	8.4	8.7	5.7	6.7	7.7	5.4	6.4	7.4	1.1	1.3	1.4	3.7	4.7	5.7	3.7	4.7	5.7	0.0	0.0	0.0

*Integration of expert's opinions

Table (6), shows $\widetilde{D}_i + \widetilde{R}_i$ and $\widetilde{D}_i - \widetilde{R}_i$, in which the importance of the indicators ($\widetilde{D}_i + \widetilde{R}_i$) and the relationship between the indicators ($\widetilde{D}_i - \widetilde{R}_i$) are specified. If $\widetilde{D}_i - \widetilde{R}_i > 0$, then the relevant indicators is effective and if $\widetilde{D}_i - \widetilde{R}_i < 0$, then the relevant indicators are impressible. Table (6) shows the Defuzzy numbers.

Table 6

The Importance and Impact of indicators (Definitive Numbers)

$(\tilde{D}_i + \tilde{R}_i)^{def}$	$(\tilde{D}_i - \tilde{R}_i)^{def}$	Indicators	
-1.96	18.46	Attention to quality	**A**
0.38	20.60	Attention to the environment	**B**
-0.35	19.66	Customer's First choice	**C**
0.06	20.25	Continuous improvement	**D**
0.34	15.77	High quality production	**E**
1.86	11.86	Group work and participation	**F**
-0.66	20.42	Removal of waste and residue	**G**
-0.90	17.67	Implementing EMS	**H**
-2.65	18.78	Implementing ISO	**I**
-0.47	19.31	Productivity Indicator	**J**
-4.09	18.50	Environmental Indicator	**K**
1.00	8.23	Timely change indicator	**L**
1.29	16.64	EMS organization	**M**
1.68	15.69	QMS organization	**N**
-0.70	21.37	Integrated audit in EMS with QMS or OHS	**O**

In Table (6), relationships between variables are also displayed. These relationships are based on the calculation of the threshold value in Table (7), which is obtained by computing the average of all numbers in this table. In the present study, the threshold value was reported as 0.58. If in table (6), the value of the numbers is higher than this value, it shows a relationship or a correlation between the two factors, and if its value is less than this number, it shows the lack of relationship between these two factors. This is shown in table (7) below, with numbers 1 and 0, meaning the existence or absence of a relationship.

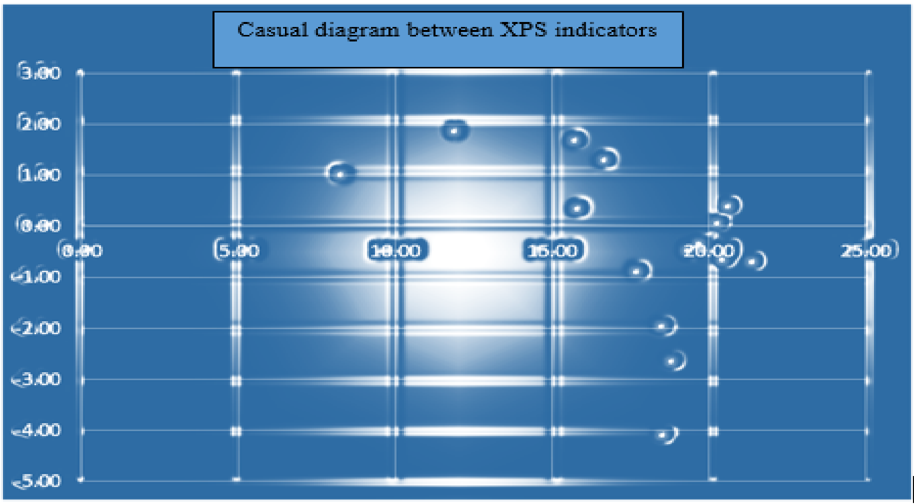
Table 7

Determination of Correlation Between XPS Indicators (1 = there is a Relationship)

O	N	M	L	K	J	I	H	G	F	E	D	C	B	A	
1	0	0	0	0	1	1	0	1	0	0	1	1	1	1	**A**
1	0	1	0	1	1	1	1	1	0	1	1	1	1	1	**B**
1	0	0	0	1	1	1	1	1	0	0	1	1	1	1	**C**
1	0	0	0	1	1	1	1	1	0	1	1	1	1	1	**D**
1	0	0	0	0	1	1	0	1	0	0	1	1	1	1	**E**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**F**
1	0	1	0	1	1	1	1	1	0	0	1	1	1	1	**G**
1	0	0	0	1	1	1	0	1	0	0	1	1	1	1	**H**
1	0	0	0	0	1	1	0	1	0	0	1	1	1	1	**I**
1	0	0	0	1	1	1	1	1	0	0	1	1	1	1	**J**
1	0	1	0	1	1	1	1	1	0	0	1	1	1	1	**K**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**L**
1	0	0	0	1	1	1	1	1	0	0	1	1	1	1	**M**
1	0	0	0	0	1	1	1	1	0	0	1	1	1	1	**N**
1	0	1	0	1	1	1	1	1	0	1	1	1	1	1	**O**

Figure (2) also shows the importance, effectiveness or in fluenceability between indicators. Horizontal axis shows the importance of indicators and the vertical axis of the effectiveness or in fluenceability of the indicators.

Figure 2
The Importance, Effectiveness or Influence Ability Between Indicators

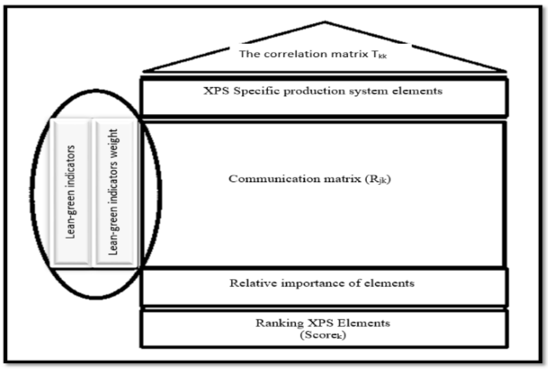


As we can see in figure(1), the extent of importance, effectiveness or in fluenceability between indicators, the Continuous Length Improvement Indicator (D) is more than the origin of other indicators (20/25 in accordance with Table 8), this means that, this indicator is more important than other indicators during effectiveness or in fluenceability of XPS system indicators. Also, the indicators of group work and participation (F with a value of 1.86) and the QMS organization (N with the value of 1.68) are the most influential indicators and the indicator of the environment (K with a value of -0.49) is the indicator with most in fluenceability.

The QFD consists of several steps. The first step was to determine the lean-green indicators in the target company, which was determined in illative analysis through T-test with one sample. In the second step, the XPS indicators related to Pars Khodro should have been extracted, which has ended with surveys of 15 indicators in line with what was previously presented. In the next step, the weights of each lean green feature should have been determined and by using F.AHP (for determining the first and second priority, the best and worst) and the BWM method (to determine the weights of each of indicator based on the comparison of the best and worst indicators) these weights were determined. Also in the next step, the correlation between the XPS indicators should have been determined, so for this purpose, the fuzzy DEMATEL method was used in Excel software, the results of which were presented in the previous section. In Figure (3), the following items are presented in the form of quality home elements in this study.

Figure 3

Quality Home Elements in Present Research



Quality home results by combining the correlation matrix between XPSs and computing their relative importance on the next page are presented in the form of a quality home. It should be noted that considering level of the relationship between lean-green indicators with the elements of XPS of Pars Khodro Company (Rjk) and the correlations between the elements of XPS (Tkk), which are represented by the fuzzy DEMATEL, the relative importance (RIk) and the final score of each element of the specific production system of XPS ($score_k$) can be calculated using the following relationships.

$$RI_K = \sum_{j=1}^{m} W_j \times R_{jk} \qquad k = 1, \dots, p \qquad (2)$$

$$score_K = RI_k \sum_{k' \neq k}^{m} T_{k'k} \times RI_{k'} \qquad k = 1, \dots, p \qquad (3)$$

In the last row, the fuzzy values obtained by using the defuzzy method are converted to definite numbers in table (8).

Table 8
The Results of the Integration (Lean-Green Production System Indicators) in F.QFD

XPS correlation matrix		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
XPS-I1	A		0.50 0.70 0.90	0.70 1.00 1.00	0.70 1.00 1.00			0.50 0.70 0.90		0.50 0.70 0.90	0.50 0.70 0.90					0.70 1.00 1.00
XPS-I2	B	0.50 0.70 0.90		0.50 0.70 0.90	0.70 1.00 1.00	0.50 0.70 0.90		0.70 1.00 1.00	0.70 1.00 1.00	0.70 1.00 1.00	0.50 0.70 0.90	0.70 1.00 1.00		0.50 0.70 0.90		0.70 1.00 1.00
XPS-I3	C	0.70 1.00 1.00	0.50 0.70 0.90		0.70 1.00 1.00			0.70 1.00 1.00	0.50 0.70 0.90	0.70 1.00 1.00	0.70 1.00 1.00	0.50 0.70 0.90				0.70 1.00 1.00
XPS-I4	D	0.70 1.00 1.00	0.70 1.00 1.00	0.70 1.00 1.00		0.70 1.00 1.00		0.70 1.00 1.00	0.70 1.00 1.00	0.70 1.00 1.00	0.70 1.00 1.00	0.50 0.70 0.90				0.70 1.00 1.00
XPS-I5	E	0.70 1.00 1.00	0.50 0.70 0.90	0.70 1.00 1.00	0.70 1.00 1.00			0.50 0.70 0.90		0.70 1.00 1.00	0.50 0.70 0.90					0.70 1.00 1.00
XPS-I6	F															
XPS-I7	G	0.50 0.70 0.90	0.50 0.70 0.90	0.50 0.70 0.90	0.70 1.00 1.00				0.70 1.00 1.00	0.50 0.70 0.90	0.70 1.00 1.00	0.70 1.00 1.00		0.70 1.00 1.00		0.70 1.00 1.00
XPS-I8	H	0.50 0.70 0.90	0.70 1.00 1.00	0.50 0.70 0.90	0.50 0.70 0.90			0.70 1.00 1.00		0.50 0.70 0.90	0.50 0.70 0.90	0.70 1.00 1.00				0.70 1.00 1.00
XPS-I9	I	0.70 1.00 1.00	0.70 1.00 1.00	0.70 1.00 1.00	0.50 0.70 0.90			0.70 1.00 1.00			0.50 0.70 0.90					0.70 1.00 1.00
XPS-I10	J	0.70 1.00 1.00	0.50 0.70 0.90	0.70 1.00 1.00	0.70 1.00 1.00			0.50 0.70 0.90	0.50 0.70 0.90	0.50 0.70 0.90		0.50 0.70 0.90				0.50 0.70 0.90
XPS-I11	K	0.50 0.70 0.90	0.70 1.00 1.00	0.50 0.70 0.90	0.50 0.70 0.90			0.70 1.00 1.00			0.50 0.70 0.90			0.50 0.70 0.90		
XPS-I12	L															
XPS-I13	M	0.50 0.70 0.90	0.70 1.00 1.00	0.50 0.70 0.90	0.50 0.70 0.90			0.70 1.00 1.00			0.50 0.70 0.90					
XPS-I14	N	0.70 1.00 1.00	0.50 0.70 0.90	0.70 1.00 1.00	0.70 1.00 1.00			0.50 0.70 0.90	0.50 0.70 0.90	0.50 0.70 0.90	0.70 1.00 1.00					0.50 0.70 0.90
XPS-I15	O	0.70 1.00 1.00	0.70 1.00 1.00	0.50 0.70 0.90	0.50 0.70 0.90	0.50 0.70 0.90		0.70 1.00 1.00	0.70 1.00 1.00	0.70 1.00 1.00	0.50 0.70 0.90	0.70 1.00 1.00		0.70 1.00 1.00		

Lean-green Indicators	W	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
LG-I1	0.411	0.7 1.0 1.0		0.7 1.0 1.0	0.7 1.0 1.0	0.7 1.0 1.0	0.3 0.5 0.7			0.7 1.0 1.0	0.0 0.0 0.3				0.7 1.0 1.0	0.3 0.5 0.7
LG-I2	0.256		0.0 0.0 0.3	0.3 0.5 0.7	0.3 0.5 0.7	0.0 0.0 0.3	0.0 0.0 0.3	0.7 1.0 1.0	0.0 0.0 0.3	0.0 0.0 0.3	0.3 0.5 0.7	0.0 0.0 0.3	0.0 0.0 0.3	0.0 0.0 0.3	0.0 0.0 0.3	0.3 0.5 0.7
LG-I3	0.156	0.0 0.0 0.3	0.7 1.0 1.0	0.0 0.0 0.3	0.3 0.5 0.7	0.0 0.0 0.3		0.7 1.0 1.0	0.7 1.0 1.0	0.7 1.0 1.0	0.3 0.5 0.7	0.3 0.5 0.7		0.7 1.0 1.0	0.0 0.0 0.3	0.3 0.5 0.7
LG-I4	0.051		0.7 1.0 1.0	0.0 0.0 0.3	0.7 1.0 1.0		0.0 0.0 0.3	0.7 1.0 1.0	0.7 1.0 1.0	0.3 0.5 0.7	0.3 0.5 0.7	0.3 0.5 0.7		0.3 0.5 0.7		0.3 0.5 0.7
LG-I5	0.060		0.3 0.5 0.7	0.0 0.0 0.3	0.0 0.0 0.3		0.0 0.0 0.3		0.3 0.5 0.7	0.0 0.0 0.3	0.0 0.0 0.3	0.7 1.0 1.0	0.3 0.5 0.7	0.7 1.0 1.0		0.3 0.5 0.7
LG-I6	0.046	0.0 0.0 0.3	0.7 1.0 1.0	0.3 0.5 0.7	0.0 0.0 0.3	0.0 0.0 0.3		0.3 0.5 0.7	0.3 0.5 0.7	0.3 0.5 0.7		0.7 1.0 1.0		0.7 1.0 1.0	0.0 0.0 0.3	0.3 0.5 0.7
RELATIVE IMPORTANCE		0.29 0.41 0.47	0.21 0.30 0.39	0.38 0.56 0.71	0.47 0.70 0.81	0.29 0.41 0.54	[illegible] 0.21 0.41	0.35 0.51 0.52	0.19 0.28 0.38	0.42 0.62 0.74	0.15 0.24 0.48	0.14 0.22 0.34	0.02 0.03 0.12	0.20 0.29 0.38	0.29 0.41 0.54	0.30 0.50 0.70
FINAL SCORE		1.66 2.84 2.89	2.17 3.56 4.13	2.03 3.60 4.53	2.34 4.18 5.76	1.94 3.43 4.10	[illegible] 0.21 0.41	2.01 3.56 3.83	1.74 3.08 2.65	1.80 3.06 3.65	1.75 3.26 2.77	1.27 2.37 1.53	0.02 0.03 0.12	1.23 2.43 1.54	1.92 3.52 3.28	2.20 4.46 4.16
CRISP VALUE		2.56	3.56	3.44	4.12	3.23	0.24	3.24	2.64	2.89	2.76	1.99	0.05	1.91	3.06	3.82

1. ***XPS-Indicators***: **XPS-I1**:Attention to quality; **XPS-I2:**Attention to environment; **XPS-I3**: Customer's first choice; **XPS-I4:** Continuous improvement; **XPS-I5:** High quality production; **XPS-I6:** Group work and participation; **XPS-I7:** Removal of waste and residue; **XPS-I8:** Implementing EMS; **XPS-I9:** Implementing ISO; **XPS-I10:** Productivity Indicator; **XPS-I11:** Environmental indicator; **XPS-I12:** Timely change indicator; **XPS-I13:** EMS organization; **XPS-I14:** QMS organization; **XPS-I15:** Integrated audit.

2. ***Lean green-Indicators***: **LG-I1**: Quality improvement; **LG-I2**: cost reduction; **LG-I3**: reduction of environmental pollution; **LG-I4**: waste reduction; **LG-I5**: reduction of additional transportation; **LG-I6**: suitable and green packaging.

Given the above findings, two important elements of the XPS are continuous improvement and integrated audit, which have a definite weight of 4.12 and 3.82, respectively. Accordingly, the timely delivery indicator is the one with the lowest weight of 0.05. Accordingly, Pars Khodro should focus on two main elements of the XPS, namely Continuous Improvement and Integrated Audit, to achieve lean-Green features in the Production System. The significance of other elements is determined in accordance with Table (9), which are ranked after third.

Table 9

Ranking of Each XPS Element Based on the F.QFD Method

Rank of the XPS Element	Crisp Value	Pars Khodro XPS Element Ranking	
1	4.12	D	Continuous improvement
2	3.82	O	Integrated audit
3	3.56	B	Attention to the environment
4	3.44	C	Customer's First choice
5	3.24	G	Removal of waste and residue
6	3.23	E	High quality production
7	3.06	N	QMS organization
8	2.89	I	Implementing ISO
9	2.76	J	Productivity Indicator
10	2.64	H	Implementing EMS
11	2.56	A	Attention to quality
12	1.99	K	Environmental Indicator
13	1.91	M	EMS organization
14	0.24	F	Group work and participation
15	0.05	L	Timely change indicator

Accordingly, continuous improvement can be considered as the most important and essential element of the XPS in Pars Khodro Company, which should be given appropriate attention to achieve lean-green indicators. Lingo software is used for linear programming of ideal programming type. The purpose of this section is to determine the extent to which the loss-making privilege is to be determined at the best supplier, in order to determine the minimum loss level. In other words, the lowest possible losses are based on the suffering of the current losses, the supplier and in which level of losses it has the most optimal status. Ideal planning was used to solve this problem.Prior to making an ideal planning, it is necessary to determine the amount of losses that can be accepted for suppliers for the next year. In order to do so, the opinions of the experts (in the supplier companies) were gathered and it was determined that how many percent of the suppliers can reduce their losses in the next year. For this purpose, a numerical period was considered, i.e, how much is the lowest probability of reduction to the maximum extent of the probability of reducing losses in the next year.In this section, according to the most important lean-green indicators: reduction of waste (Y1), reduction of environmental pollution (Y2), cost reduction (Y3), quality improvement (Y4), as well as reduction of additional transportation (Y5), the results obtained in this section are summarized in Table (10).

Table 10

Minimum and Minimum of Suppliers Losses Reduction in the Next Year

Minimum	Minimum	Maximum reduction Percentage	Minimum reduction Percentage	Minimum percentage	K	Variable names	Indicators
99.25	99.5	0.75	0.5	5% to 75%	100	waste reduction (Y1)	S1
212.625	216	12.375	9	4% to 5/5%	225	reduction of environmental (Y2)	S2
382	388	18	12	3% to 4/5%	400	pollution cost reduction (Y3)	S3
97.25	98.25	2.75	1.75	1/75% to 2/75%	100	quality improvement (Y4)	S4
217.125	221.625	7.875	3.375	1/5% to 2/5%	225	reduction of additional transportation (Y5)	S5

Min z =

$0.415\ (d_1^- + e_1^-) +$

$0.294\ (d_2^- + e_2^-) +$

$0.162\ (d_3^- + e_3^-) +$

$0.085\ (d_4^- + e_4^-) +$

$0.045\ (d_5^- + e_5^-)$

s.t

$$470.400x_1 + 66.150x_2 + 66.150x_3 + 470.400x_4 + 66.150x_5 - d_1^+ + d_1^- = y_1$$

$$y_1 - e_1^+ + e_1^- = 99.25$$

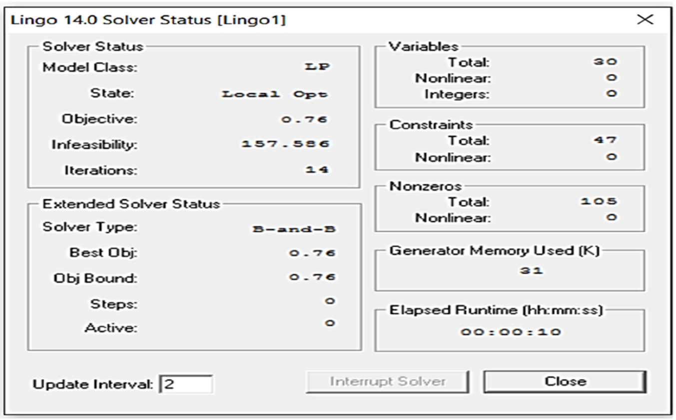
$$99.25 \leq y_1 \leq 99.5$$

$$76.500x_1 + 19.125x_2 + 34x_3 + 76.500x_4 + 53.125x_5 - d_2^+ + d_2^- = y_2$$

$$y_2 - e_2^+ + e_2^- = 216$$

$216 \leq y_2 \leq 212.625$
$0.180x_1 + 0.5x_2 + 0.367x_3 + 0.5x_4 + 0.281x_5 - d_3^+ + d_3^- = y_3$
$y_3 - e_3^+ + e_3^- = 382$
$382 \leq y_3 \leq 388$
$4.611x_1 + 2.594x_2 + 2.049x_3 + 3.388x_4 + 4.611x_5 - d_4^+ + d_4^- = y_4$
$y_4 - e_4^+ + e_4^- = 97.25$
$97.25 \leq y_4 \leq 98.25$
$1.013x_1 + 1.8x_2 + 1.013x_3 + 1.013x_4 + 1.322x_5 - d_5^+ + d_5^- = y_5$
$y_5 - e_5^+ + e_5^- = 221.625$
$221.625 \leq y_5 \leq 217.125$
$x_1 + x_2 + x_3 + x_4 + x_5 = 1$
$x_i \geq 0, i = 1,2,3,4,5$
$d_i^+, d_i^-, e_i^+, e_i^- \geq 0,$
$i = 1,2, \dots, 5$
The results of this section are shown in Figure (4).

Figure 4
Initial Results of Goal Programming Calculations in Lingo Software



The results show that the program has an local optimum answer. If the model does not have any non-linear constraints, each local optimum will be a general optimum (Ajarlou, 2013). Accordingly, it can be stated that given the obtained results, the proposed programming model has an optimal response of 0.76. Accordingly, it can be stated that by using the proposed model, the amount of losses can be reduced to 0.76. Given the mentioned results, supplier X2 (the second supplier) should be used with specified determination coefficients.

Table 11

Determination of the Loss Coefficients for the Lowest Loss

Initial Maximum	Initial Minimum	High Amount Recommended	Variable Names
99.25	99.5	99.25	waste reduction (Y1)
212.625	216	212.625	reduction of environmental (Y2) pollution
382	388	382	cost reduction (Y3)
97.25	98.25	25.97	quality improvement (Y4)
217.125	221.625	217.125	reduction of additional transportation (Y5)

On this basis, it is clear that for the lowest possible losses, supplier No. 2 is the best status given the losses reported in Table (11). Accordingly, supplier No. 2 should reduce its estimated losses as much as the minimum reported in Table (11).

Discussion and Conclusion

It should be noted that due to the exploration of this research and its new aspect of LGPS , it is not possible to be compared with other studies which has been published yet. However, according to the review, this section can be used to refer to a series of matching studies that have been introduced a specific production system that includes six main elements. According to the results, this study consistent with kurdve et al. (2014) study that all companies use indicators such as quality, environment and to be the first choice of the customers, to define their XPS which is called values and vision. In relation to the second element, the principle, it is consistent with the results obtained from Blücher & Öjmertz (2008) and Netland (2013) studies that includes indicators such as continuous improvement, high quality production, group work and the participation and removal of waste and residue. On the other hand, tools, methods and techniques are also introduced, as the pillars of corporations XPS. This is in line with the reviews of the present study which includes implementing EMS and ISO which is also consistent with the results of kurdve et al. (2014) research. kurdve et al. (2014), by reviewing other studies consider implementing systems such as environmental management systems and indicators as one of the essential factors for a production system.Using key performance indicators can also be introduced as another key element for a specific production system for companies which according to the present study could include dimensions such as productivity indicator, environmental indicator and timely change indicator. In light of the review of other studies, e.g Kurdve & Daghini (2012) and (Jayaram et al., 2010), the productivity indicator, the environmental indicator and timely change indicator are among the key indicators based on the key performance indicators which is expected to be used by production companies.Also, according to Magnusson et al. (2003), the creation of organizations in companies to organize and achieve the identified goals and prospects are among the key elements of the company. In this research, EMS and QMS organizations are among the main organizations that Pars Khodro utilizes to achieve its goals. Finally, the audit element is also the last element of a specific production system and is a subject that production firms utilize in line with Harlin et al. (2008) view. This could include the integration of numerous organizations that according to the findings of this research at Pars khodro Corporation, an integrated audit on EMS with QMS or OHS as the sixth element of XPS, is debatable.For future research, researchers suggest to investigate other aspect LGPS and test it in other industries. We recommend to be considered more dimensions of environmental in LGPS.Further above, the next authors can improve goal programming model.

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