



Designing a Sustainable Supply Chain Model with an Emphasis on Behavioural Factors for Foodstuffs in Kermanshah Province

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ABSTRACT

In the last two decades, many researches about the sustainable supply chain have focused mainly on its environmental aspect. Environment is one of the key elements of the threefold sustainability policy and an intermediary for topics such as climate change and increased energy. To some extent, the terms "environment" and "sustainability" have been used interchangeably by researchers and managers. This misunderstanding has been very common especially in recent years. The environment, although at the beginning was a prospect for the start of the sustainable supply chain, then an identical concept and application of the term sustainability as the threefold policy (economy, environment, and community) emerged which is now expanding. The purpose of this research is to design a sustainable supply chain model with an emphasis on behavioral factors for foodstuff in Kermanshah province. This is an applied research. The literature review is based on library study such as books, journals, dissertations, articles, and so on. Data were collected through a questionnaire and analyzed by statistical methods. Regarding the subject of this research, the study population consists of managers and staff associated with the supply chain in Kermanshah food companies, involving 100 people. Structural equation modeling and PLS software were used to turn out analyzed data to the training environment, innovation, motivation, staff empowering, mutual trust and respect information. Teamwork had a positive and significant effect on the sustainable supply chain which estimated by environmental, social and economic indicators.

1 Introduction

In the last two decades, research on the sustainable supply chain has focused mainly on its environmental aspect. Environment is one of the key elements of the threefold policy of sustainability and an intermediary for topics such as climate change and increased energy. The terms "sustainability" and "environment" were used interchangeably by researchers and managers. This misunderstanding has been very common especially in recent years. Environment, though, was a prerequisite for the start of a sustainable supply chain, but now used as an identical understanding and application of the term sustainability as the threefold policy (economy, environment and community) has been emerged which is expanding [6]. Instead of focusing only on environmental issues, new research has taken a more

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general view through integrating environmental issues or social responsibility (sharing the environmental and social performance) or sustainability (threefold policy). Most of the papers from 2001 to 2010 used social responsibility and sustainability as their research framework [6]. Three conceptual components were identified in social sustainability dimension. The first category assesses the population access to basic needs [20]. This category includes three indicators: access to sewer drainage system; access to improved drinking water; and access to health services [15]. This category is a measure of inclusion, as well as a measure of providing the basic physical needs. The second category is related to the concept of perceived economic security, and as a result, this category intends to measure the vulnerability of the population to economic deprivation. Three indicators have been selected for this category: vulnerable employment as a percentage of total employment, the level of informal economy and the net amount of social safety protection. The third category is considered as an assessment of social cohesion, including indicators of the Gini index of income, social dynamism, and youth unemployment [17]. Sustainable supply chains can lead to higher profits and higher stock values. There are three main channels for influencing supply chain techniques [21]. The first channel focuses on the sustainability of supply chain behaviour on customers.

The second channel influences the sustainability of the supply chain behaviour on the production mode of a firm. The third channel is the effect of equity valuation against financial risk mitigation [17]. In order to develop this dimension, the competitiveness dimension of the World Economic Forum has also joined to the collaboration of two institutions which contributed to the development of the Environmental Performance Index (EPI), and also has developed the environmental sustainability index at the national level. In this dimension, there are three main categories [27, 28]. The first category is an environmental policy that includes the criterion of the intensity and implementation of environmental laws, along with the degree of protected fields, which leads to an assessment of the commitment of the countries to protecting natural capital. The second category is related to the amount of using non-renewable resources. These indicators include water utilization rates in the agricultural field, which shows how water used efficiently in this sector. The third category measures the degree of environmental degradation that can lead to serious damage to human health and destruction of the ecosystem [17]. Prior to the 1960s, developmental efforts focused on increasing economic returns and national wealth in countries. But from 1960s, the development involved more comprehensive boundaries and non-economic considerations, such as human development, justice and the preservation of human and environmental values. Also, equitable growth patterns were also raised with issues such as poverty eradication and fair distribution of income [5]. On the other hand, the universal thinking in the fields of development and growth replaced the constrained-to-the-border thinking, i.e. the development that encouraged recovery on the planet. As a result, the relationship between the environment and economic growth in a wider world became increasingly important and from the 1980s onwards, the issue of sustainable development replaced the economic development in the international societies and assemblies. The Earth Summit in Rio de Janeiro in 1992 showed the importance of this issue more than ever all over the world. The agenda called for countries to develop a national strategy for sustainable development [26]. According to researches carried out by many experts, however, no significant results of this program have ever been observed in global decisions and/or at national levels. Nevertheless, the outcomes of the summit in some United Nations committees and global conferences are still being pursued. In fact, the discussion of sustainable development initially concerned two major issues: One is associated with the unrecoverable resources in the world, such as fossil fuels and other issues of environmental pollution

and planet pollution. It's noteworthy that these two factors are the first and most important factors in discussing the sustainable development in the world. [9]. The current course of human activities is such that it has a severe negative impact on the planet. The growing consumption of fossil fuels, underground resources, and damage to the environment have created a process that, if continued, the growth and development resulted would be unsustainable. One of the important dimensions of sustainability is at the supply chain level. Manufacturing processes are often distributed around the world. Suppliers, main factories and customers are linked with the flow of information, materials and capital. According to this important issue, major companies in the supply chain are responsible for the environmental and social performance of their suppliers and distributors.

Main Focus and emphasis was on social, environmental and economic dimensions of sustainable supply chain which has created a sustainability culture. The sustainability culture also promotes the operational performance and the reputation of organizations as well [17]. Considering the benefits derived from dimensions of sustainable supply chain, such as the use of environmental initiatives, gaining economic benefits, increasing the efficiency of operations, and improving the public credibility of the organization, meeting the dimension of "people" in the supply chain makes the necessity of using the sustainable supply chain more obvious for various industries. Therefore, this research seeks to design a sustainable supply chain model with an emphasis on behavioral factors for the food industry. Undoubtedly, the impact of manufacturing organisations on the environment is a growing concern, leading to demands for sustainable practices which meet environmental, economic, and social needs [1, 7, 16]. Indeed, all organisations are now 'obliged' to make more effort in balancing their economic, social, and environmental performance, especially for those with community, competitive and regulatory pressures [3, 30]. Achieving this balance is perceived as a difficult and, in some cases, controversial challenge [10, 14]. Therefore, the conceptual model of the research was adapted as follows from different sources.

2 Literature Review

Supply chain sustainability is increasingly recognized as a key component of corporate responsibility. Managing the social, environmental and economic impacts of supply chains, and combating corruption, makes good business sense as well as being the right thing to do. However, supply chains consist of continuously evolving markets and relationships [12]. Supply chain sustainability is the management of environmental, social and economic impacts, and the encouragement of good governance practices, throughout the lifecycles of goods and services. The objective of supply chain sustainability is to create, protect and grow long-term environmental, social and economic value for all stakeholders involved in bringing products and services to market. By integrating the UN Global Compact principles into supply chain relationships, companies can advance corporate sustainability and promote broader sustainable development objectives [18].

There are numerous reasons why companies start a supply chain sustainability journey. Primary among them is to ensure compliance with laws and regulations and to adhere to and support international principles for sustainable business conduct. In addition, companies are increasingly taking actions that result in better social, economic and environmental impacts because society expects this and because there are business benefits to doing so. By managing and seeking to improve environmental, social and economic performance and good governance throughout supply chains, companies act in their own interests, the interests of their stakeholders and the interests of society at large [4]. The degree that the

manufacturer cooperates strategically with its supply chain partners and collectively manages its internal and external processes in order to achieve sustainability [11, 29].

3 Research Hypotheses and Research Model

3.1 Basic Definitions

In this section we review some useful definitions that are used throughout the paper.

Definition 1 (Training) Training is a learning-based experience and aims at making a relatively stable change in the person, to enable him/her to perform and improve his/her abilities, change skills, knowledge, attitudes and social behaviour [12]. Therefore, training is changing knowledge and attitude, and having interaction with colleagues. Training requires the use of predictable programs that enhance competencies in the staff and encourage acquiring new knowledge, skills and abilities in the individual, so that it facilitates the improvement of job performance [24].

Definition 2 (Innovation) Innovation means the use of new creative thoughts that can be a new product, service, or way of doing things in an organization [2].

Definition 3 (Motivation) The potential internal preparedness or tendency to respond to a particular external stimulus or position, from among the different situations and stimuli, can be called motivation [25].

Definition 4 (Teamwork) A team refers to a limited number of people who have complementary skills and common goals, objectives and approaches based on join together and rely on each other [8].

Definition 5 (Staff Empowering) Empowering people is encouraging them to more participate in decision making that affect their activities; it means providing a situation for people to create good ideas and turn them into actions [23].

Definition 6 (Mutual Trust and Respect) Charlton considers trust as a non-negotiable and continuous learning process in any relationship, such as trusting a child in accepting and delegating responsibility [19]. Respect is a positive emotional value of appreciating and attention to an individual or object that is regarded as deserving respect by a person. A person who respects a person or a thing and takes care of that person or thing and values them. This valuation may subsequently reveal itself in the behaviour and performance of the venerator towards the respected side [13].

3.2 The Research hypothesis

The main hypothesis of the current research is:

Behavioural factors will improve the performance of the sustainable supply chain.

Also, this study follows the following sub-hypotheses:

1. Staff training will improve the performance of the sustainable supply chain.
2. Staff innovation will improve the performance of the sustainable supply chain.
3. Staff motivation will improve the performance of the sustainable supply chain.
4. Teamwork will improve the performance of the sustainable supply chain.
5. Staff empowerment will lead to the satisfactory performance of the sustainable supply chain.
6. Mutual trust and respect will lead to the effective performance of the sustainable supply chain.

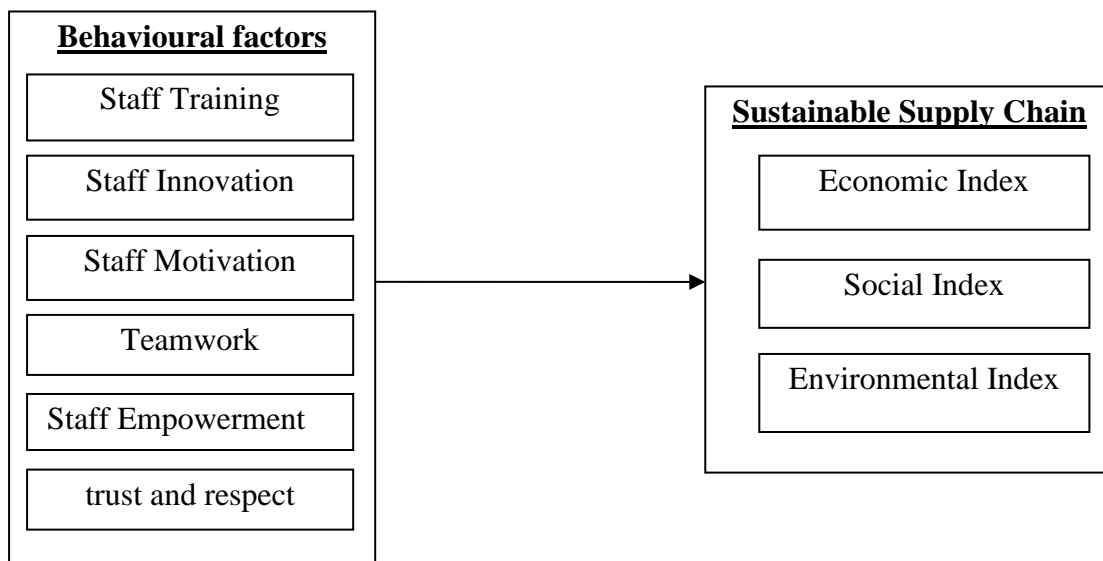


Fig.1: Conceptual Model [17, 30].

4 Proposed Methodology and Findings

Conducting this research lasted from the end of December, 2017 until the beginning of January 2018. However, the information gathered from the experts has been compiled in a six-month period from April to August 2017. Thematically, this research presents a model for the development of a sustainable supply chain with an emphasis on behavioural factors in the food industry with a procedural and systemic approach. Therefore, it is categorized in the field of supply chain management. The food companies are included in terms of location in Kermanshah province. This research is an applied study based on its purpose. On the other hand, it is not type of experimental research, but it is a non-experimental research. In this study, the researcher should seek to establish a fundamental theory and a normative model, so that managers can use it to formulate and provide a sustainable supply chain in the food industry. Although the development of such a model for the formulation and delivery of a sustainable supply chain in the food industry is difficult and sometimes impossible. There are some tools and techniques that can help develop such a model. The development of a theoretical structure for the formulation and presentation of a sustainable supply chain in the food industry requires an integrated approach based on inductive techniques. The number of food companies in Kermanshah province is about 30 enterprises. It has been tried to increase the reliability and generalizability of the model through doing a survey in all companies and taking the opinion of all managers and experts employed. The statistical population involved 100 people. In order to collect the required data in this research, a questionnaire was used which designed based on the five-point Likert scale. The number of exclusive questions was 50 which were dealt with from the view point of managers and food industry staff in Kermanshah. Validity of the questionnaire was investigated through a formal method, and the reliability of the questionnaire was assessed by Cronbach's alpha test, which is appropriate and equals 0.769.

5 Data Analysis

In this research, the structural equation modeling method using PLS software was applied for data analysis.

Table 1: Coding the general research model

Codes	Variable's name
V1	Training
V2	Staff empowering
V3	Motivation
V4	Innovation
V5	Mutual trust and respect
V6	Teamwork
V7	Social indices
V8	Environmental indices
V9	Economic indices
V10	Performance of a sustainable supply chain
V11	Behavioral factors

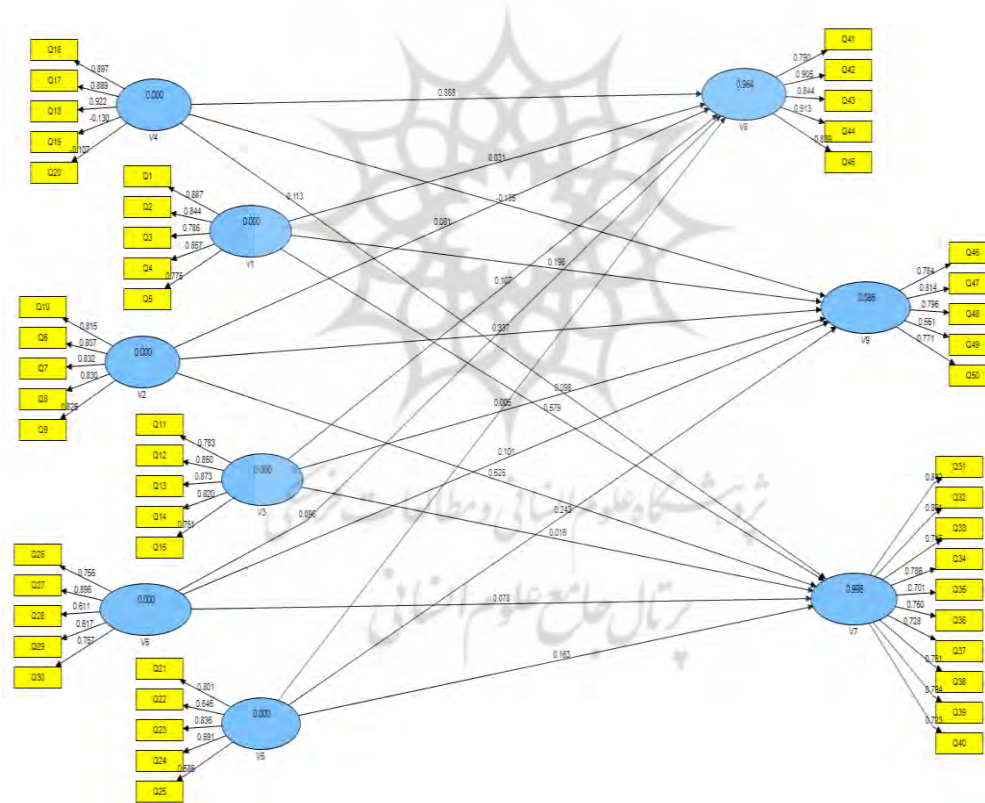


Fig. 2: The structural equation model in the state of verifying factor loadings

As noted earlier, the criterion for fitness of the coefficients of factor loadings is 0.4. As shown in Table 2, the coefficients of factor loadings of questions that are less than 0.4 indicate inappropriateness

criteria and have been eliminated.

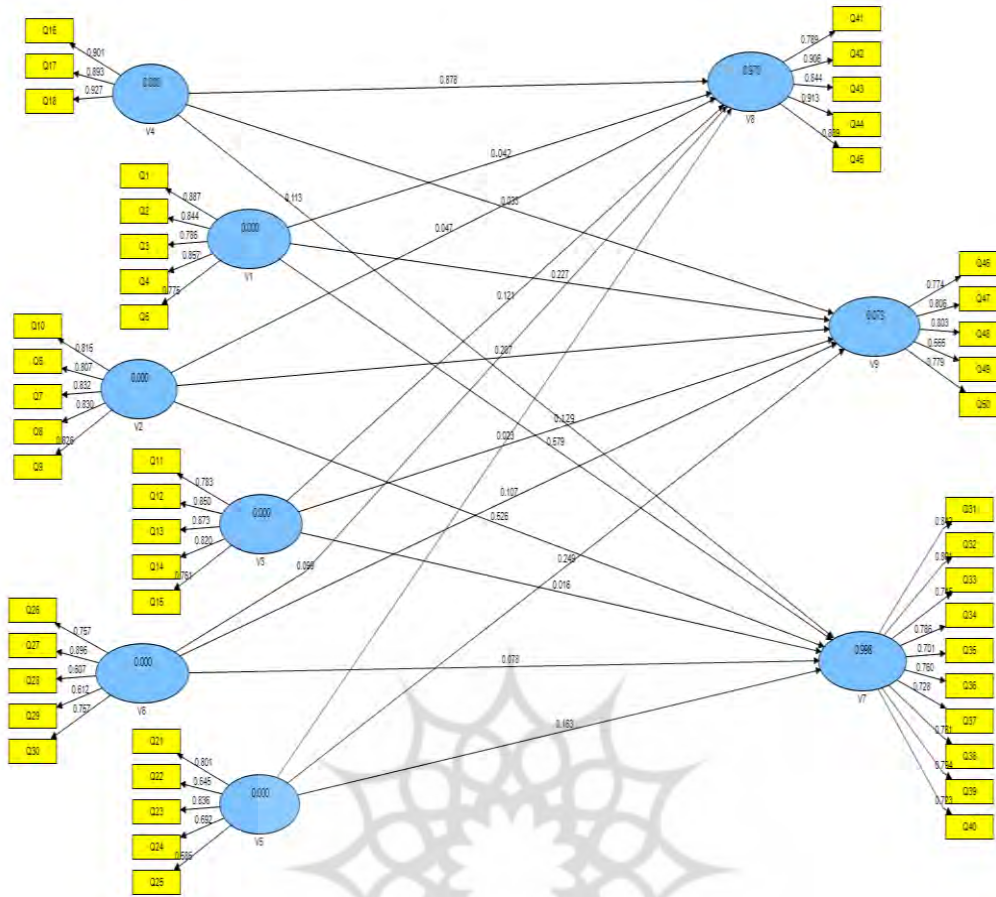


Fig. 3: The structural equation model in the state of verifying corrective factor loadings

Therefore, questions number 19 and 20 were removed from the research questions in order to find the optimal factor loading. Studying the significance coefficients of Z (t-values) of the main hypothesis.

Table 2: Factor loadings coefficients

Construction	Questions	Factor loading of the model	Result	Factor loading of the corrective model	Result
Training	Q1	0.887	Optimal	0.887	Optimal
	Q2	0.844	Optimal	0.844	Optimal
	Q3	0.786	Optimal	0.786	Optimal
	Q4	0.857	Optimal	0.857	Optimal
	Q5	0.775	Optimal	0.775	Optimal
Staff empowering	Q6	0.807	Optimal	0.807	Optimal
	Q7	0.832	Optimal	0.832	Optimal
	Q8	0.830	Optimal	0.830	Optimal
	Q9	0.826	Optimal	0.826	Optimal
	Q10	0.815	Optimal	0.815	Optimal

Table 2: Continue

Construction	Questions	Factor loading of the model	Result	Factor loading of the corrective model	Result
Green motivation	Q11	0.783	Optimal	0.783	Optimal
	Q12	0.850	Optimal	0.850	Optimal
	Q13	0.873	Optimal	0.873	Optimal
	Q14	0.820	Optimal	0.820	Optimal
	Q15	0.761	Optimal	0.761	Optimal
Innovation	Q16	0.897	Optimal	0.901	Optimal
	Q17	0.889	Optimal	0.893	Optimal
	Q18	0.922	Optimal	0.927	Optimal
	Q19	-0.130	Non-optimal	Eliminated	--
	Q20	-0.107	Non-optimal	Eliminated	--
Mutual trust and respect	Q21	0.801	Optimal	0.801	Optimal
	Q22	0.645	Optimal	0.645	Optimal
	Q23	0.836	Optimal	0.836	Optimal
	Q24	0.691	Optimal	0.692	Optimal
	Q25	0.586	Optimal	0.585	Optimal
Teamwork	Q26	0.756	Optimal	0.757	Optimal
	Q27	0.896	Optimal	0.896	Optimal
	Q28	0.611	Optimal	0.607	Optimal
	Q29	0.617	Optimal	0.612	Optimal
	Q30	0.757	Optimal	0.757	Optimal
Social indices	Q31	0.842	Optimal	0.842	Optimal
	Q32	0.801	Optimal	0.801	Optimal
	Q33	0.745	Optimal	0.745	Optimal
	Q34	0.786	Optimal	0.786	Optimal
	Q35	0.701	Optimal	0.701	Optimal
	Q36	0.760	Optimal	0.760	Optimal
	Q37	0.728	Optimal	0.728	Optimal
	Q38	0.781	Optimal	0.781	Optimal
	Q39	0.794	Optimal	0.794	Optimal
	Q40	0.723	Optimal	0.723	Optimal
Environmental indices	Q41	0.790	Optimal	0.789	Optimal
	Q42	0.905	Optimal	0.906	Optimal
	Q43	0.844	Optimal	0.844	Optimal
	Q44	0.913	Optimal	0.913	Optimal
	Q45	0.839	Optimal	0.839	Optimal
Economic indices	Q46	0.784	Optimal	0.774	Optimal
	Q47	0.814	Optimal	0.806	Optimal
	Q48	0.796	Optimal	0.803	Optimal
	Q49	0.551	Optimal	0.555	Optimal
	Q50	0.771	Optimal	0.779	Optimal

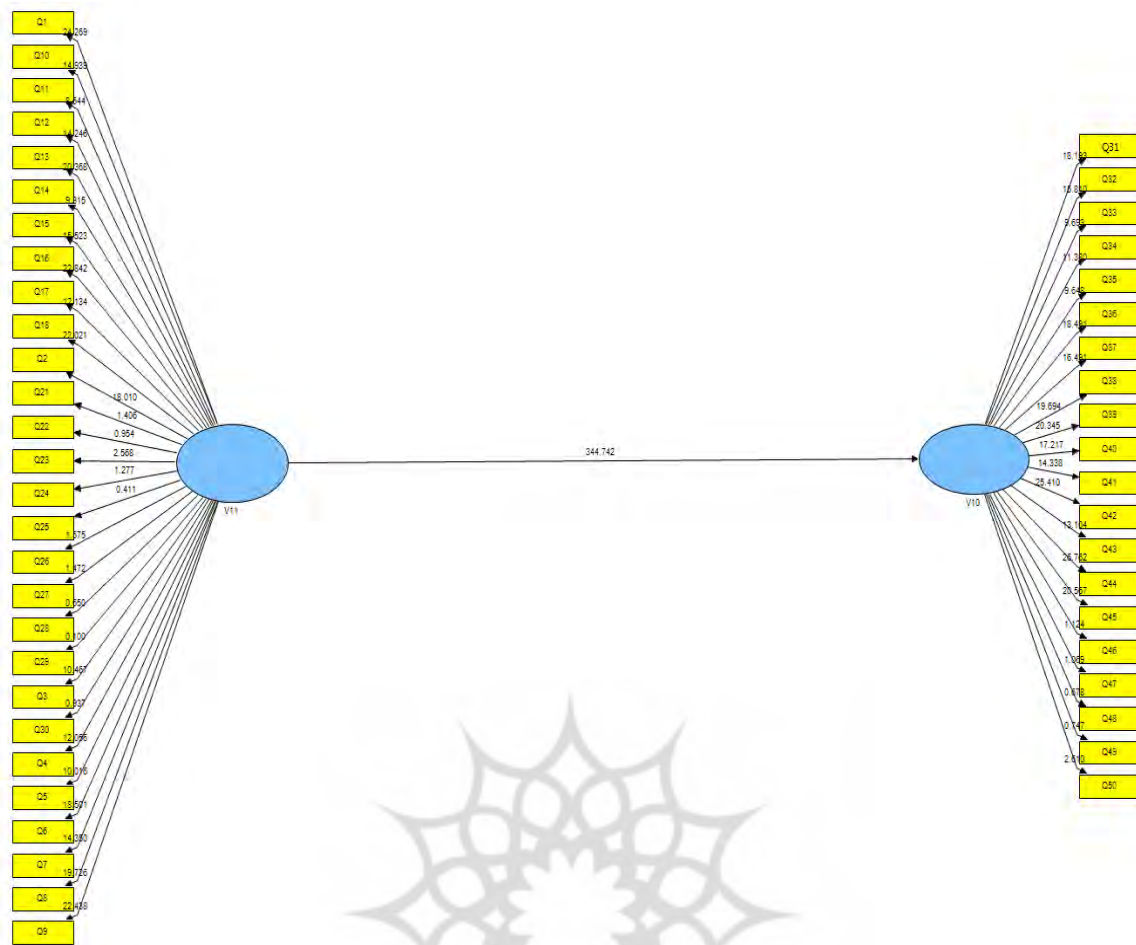


Fig. 4: The model in the state of significant coefficients for hypothesis 1

Investigating the (effectiveness of) standardized coefficients related to the main hypothesis. As the results shown, the effect of behavioral factors on the performance of the sustainable supply chain is 0.986 and its significance is 344.742. Investigating the significant coefficients of (t-values) associated with each of the sub-hypotheses. Investigating the (effectiveness of) standardized coefficients associated with each of the hypotheses.

As the results shown, the impact of training on the performance of the sustainable supply chain is 0.364 and its significance is 14.256. The effective value of empowering the staff on the performance of the sustainable supply chain is 0.383 and its significance is 13.190. The effect of green motivation on the performance of the sustainable supply chain is 0.040 and its significance is 2.731. The impact of innovation on the performance of the sustainable supply chain is 0.323 and its significance is 14.423. The impact of mutual trust and respect on the performance of the sustainable supply chain is 0.018 and its significance is 1.756. The impact of teamwork on the performance of the sustainable supply chain is 0.093 and its significance is 1.190.

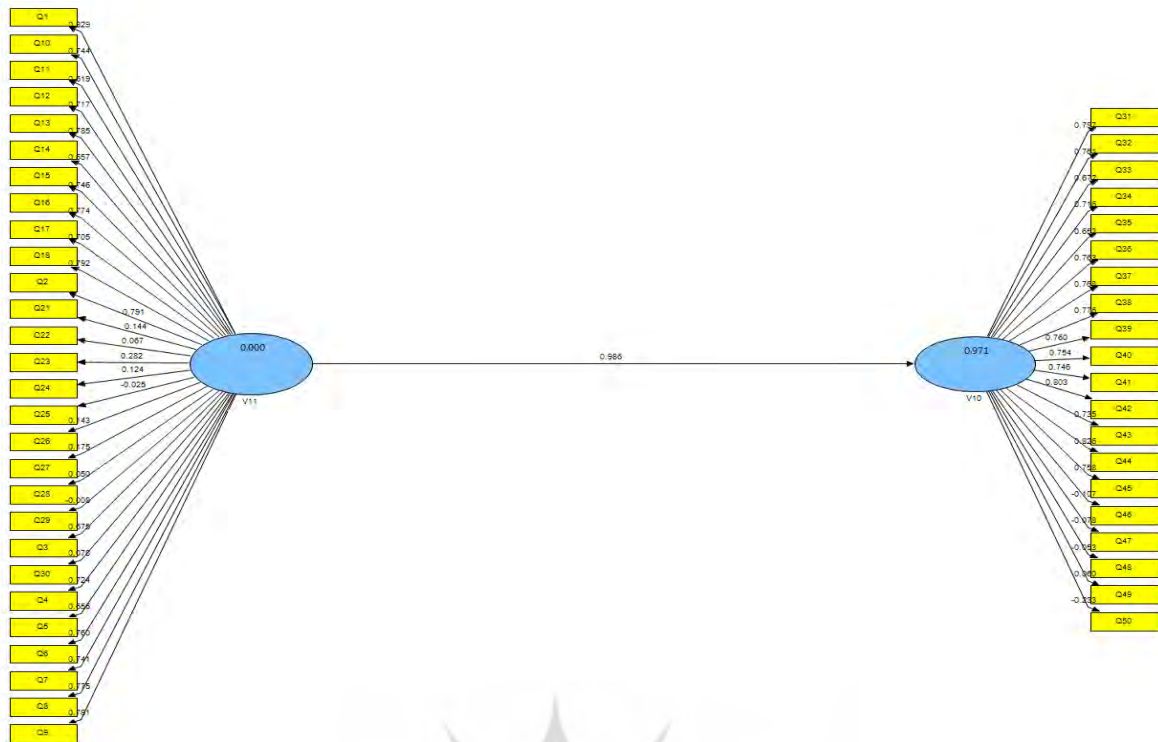


Fig. 5: The model in the state of (effectiveness of) standard estimation coefficients for hypothesis 1

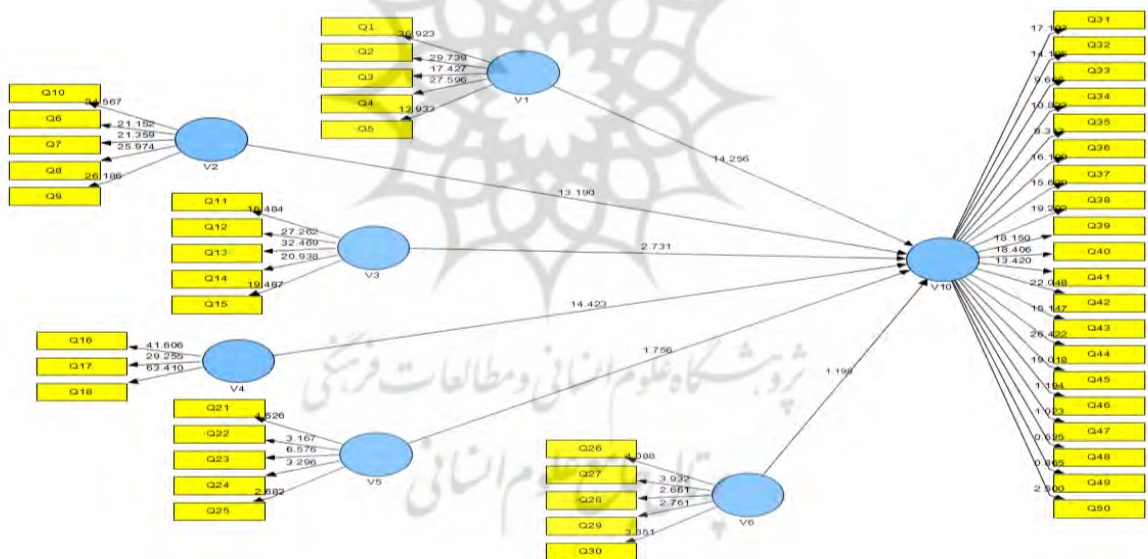


Fig. 6: The model in the state of significant coefficients for sub-hypotheses

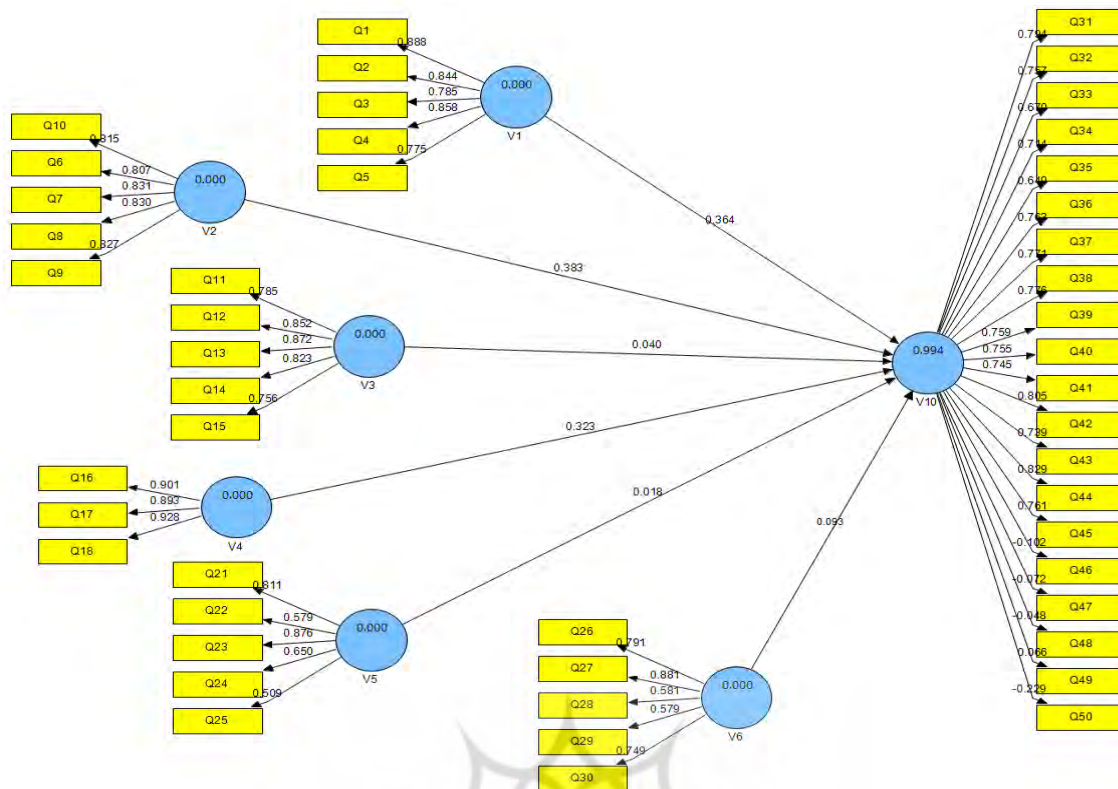


Fig. 7: The model in the state of (effectiveness of) standard estimation coefficients for hypotheses 2 to 7

6 Results of the Proposed Model

Using the structural equation modelling method, relationships between different variables of the model dimensions were introduced through a questionnaire for 100 managers and experts in the field of supply chain and their comments were received. A summary of the results of the analysis is outlined below.

Main hypothesis: Behavioral factors will improve the performance of the sustainable supply chain.

According to the structural model of the research in figures 4 and 5 and also based on the software output, the significance level of the hypothesis is 344.742. Values of significance test more than 1.96 or less than -1.96 indicate the significance of relationships. The basis of confirmation or rejection of the assumptions (significant relationships) is in investigating the model in the state of significance coefficients. At the error level of 0.05 and the two-way test (normal default), the critical values are 1.96 and -1.96. If the coefficients are more than 1.96 or less than -1.96, then the null hypothesis would have rejected and the research hypothesis, that is the existence of a significant relationship, is supported. It means, behavioral factors can significantly improve the performance of the sustainable supply chain. While this effect is 0.986, given the fact that the coefficient is positive, its effect is direct. This means that for each unit of strengthening the behavioral factors, the sustainable supply chain will be strengthened by 0.986. Therefore, this high effect indicates the optimal improvement of the sustainable supply chain by behavioral factors.

Hypothesis 2: Staff training will improve the performance of the sustainable supply chain.

Regarding the structural model of the research in figures 6 and 7 and based on the software output, the significance level of the hypothesis is 14.256. Values of significance test more than 1.96 or less than -1.96 indicate the significance of relationships. The basis of confirmation or rejection of the assumptions (significant relationships) is in investigating the model in the state of significance coefficients. At the error level of 0.05 and the two-way test (normal default), the critical values are 1.96 and -1.96. If the coefficients are more than 1.96 or less than -1.96, then the null hypothesis is rejected and the research hypothesis, that is the existence of a significant relationship, is supported. It means that staff training can significantly improve the performance of the sustainable supply chain. While this effect is 0.364, given the fact that the coefficient is positive, its effect is direct. This means that for each unit of increasing the staff training, the sustainable supply chain will be strengthened by 0.364.

Hypothesis 3: Staff innovation will improve the performance of the sustainable supply chain.

Regarding the structural model of the research in figures 6 and 7 and based on the software output, the significance level of the hypothesis is 14.423. Values of significance test more than 1.96 or less than -1.96 indicate the significance of relationships. The basis of confirmation or rejection of the assumptions (significant relationships) is in investigating the model in the state of significance coefficients. At the error level of 0.05 and the two-way test (normal default), the critical values are 1.96 and -1.96. If the coefficients are more than 1.96 or less than -1.96, then the null hypothesis is rejected and the research hypothesis, that is the existence of a significant relationship, is supported. That is, staff innovation can significantly improve the performance of the sustainable supply chain. While this effect is 0.323, given the fact that the coefficient is positive, its effect is direct. This means that for each unit of increasing the staff innovation, the sustainable supply chain will be strengthened by 0.323.

Hypothesis 4: Staff motivation will improve the performance of the sustainable supply chain.

Regarding the structural model of the research in figures 6 and 7 and based on the software output, the significance level of the hypothesis is 2.731. Values of significance test more than 1.96 or less than -1.96 indicate the significance of relationships. The basis of confirmation or rejection of the assumptions (significant relationships) is in investigating the model in the state of significance coefficients. At the error level of 0.05 and the two-way test (normal default), the critical values are 1.96 and -1.96. If the coefficients are more than 1.96 or less than -1.96, then the null hypothesis is rejected and the research hypothesis, that is the existence of a significant relationship, is supported. That is, motivating the staff can significantly improve the performance of the sustainable supply chain. While this effect is 0.040, given the fact that the coefficient is positive, its effect will be direct. This means that for each unit of increasing the staff motivation, the sustainable supply chain will be strengthened by 0.040.

Hypothesis 5: Teamwork will improve the performance of the sustainable supply chain.

According to the structural model of the research in figures 6 and 7 and based on the software output, the effect of teamwork on the performance of the sustainable supply chain was 0.093; this effect is unreliable, because the significance level of the hypothesis equals 1.190, which is less than the critical value of 1.96. The significance test values more than 1.96 or less than -1.96 indicate the significance of relationships. The basis of confirmation or rejection of the assumptions (significant relationships) is in investigating the model in the state of significance coefficients. At the error level of 0.05 and the two-way test (normal default), the critical values are 1.96 and -1.96. Because the case is different in this hypothesis. So the assumption of the research is rejected. It suggests that teamwork in this research failed to play a role in improving the performance of the sustainable supply chain in an optimal manner.

Hypothesis 6: Staff empowerment will lead to the optimal performance of a sustainable supply chain.

Regarding the structural model of the research in figures 6 and 7 and based on the software output, the significance level of the hypothesis is 13.190. Values of significance test more than 1.96 or less than -1.96 indicate the significance of relationships. The basis of confirmation or rejection of the assumptions (significant relationships) is in investigating the model in the state of significance coefficients. At the error level of 0.05 and the two-way test (normal default), the critical values are 1.96 and -1.96. If the coefficients are more than 1.96 or less than -1.96, then the null hypothesis is rejected and the research hypothesis, that is the existence of a significant relationship, is supported. That is, empowering the staff can significantly improve the performance of the sustainable supply chain. While this effect is 0.383, given the fact that the coefficient is positive, its effect will be direct. This means that for each unit of increase in staff empowering, the sustainable supply chain will be strengthened by 0.383.

Hypothesis 7: Mutual trust and respect will lead to the effective performance of the sustainable supply chain.

Regarding the structural model of the research in figures 6 and 7 and based on the software output, the effect of mutual trust and respect on implementation of the sustainable supply chain was 0.018; this effect was unreliable, because the significance level of the hypothesis is 1.756, which is less than the critical value of 1.96. Values of significance test more than 1.96 or less than -1.96 indicate the significance of relationships. The basis of confirmation or rejection of the assumptions (significant relationships) is in investigating the model in the state of significance coefficients. At the error level of 0.05 and the two-way test (normal default), the critical values are 1.96 and -1.96. Because the case is different in this hypothesis. So the assumption of the research is rejected. This suggests that mutual trust and respect in this study failed to play a role in improving the implementation of the sustainable supply chain in an optimal manner.

7 Conclusion and Suggestions

From a practical point of view, this study can contribute to achieving the strong sustainable performance of manufacturing firms by directing their managers to link environmental strategic objectives with specific HRM and SCM practices. This linkage can generate the deep involvement of staff in shaping environmental practices. Primarily, an empirically based argument is outlined for organisations to invest in a model of environmental management which appeals to human resource managers and supply chain managers, as such an action may enhance the company's sustainable performance. Second, the study's results serve as a guideline for managers to stress synergetic investments in GHRM, such as initiatives to improve employee motivation and knowledge. The managers should then continue with dedicated investments in SSCM and, consequently, the creation of a cross-functional approach to green management. Third, the results of this research also provide advice to managers who seek concurrent improvement of sustainable performance. It should be taken into consideration that the internal SSCM practices positively influence sustainable performances, while external SSCM practices only influence a firm's EP. The integration of environmental standards beyond organisational limits does not, therefore, thoroughly demonstrate an organisation's capability, and so special attention may be needed on this matter. For example, supply chain managers must pay attention to HRM practices. Also, the top

management must be aware that resistance to change can be an obstacle SSCM implementation; this barrier can be avoided through green hiring and selection, alongside providing sufficient awareness and environmental training for employees. It may be said that the real contribution of this study is that there is empirical evidence for manufacturers to understand which actions to adopt in terms of having a bigger impact on the Triple Bottom Lines of sustainability. Fourth, based on this research, it is possible to propose specific improvements in the employees' training procedures in manufacturing organisations. For example, it is imperative that part of employees' training and education includes an indicator on hours of green training, as suggested by GRI (2016). Hence, the environmental training indicator must be taken in consideration in the process of firms' reporting on their impact on the Triple Bottom Lines of the sustainability.

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