The Role of Creative Thinking on Greening the Supply Chain Management in Algerian Startups

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Abstract:

The study contributed to testing the role of creative thinking on greening the practices of the supply chain management in Algerian Startups, through a questionnaire as a surveying tool for collecting random sample data of 100 founders, using modeling the causal structural equation and AMOS & SPSS in statistical processing.

The results showed a positive significant effect of creative thinking skills for greening the practices of the supply chain management, where the flexibility has had the highest impact while the originality was less effective.

Keywords: Green supply chain management; creative thinking; environmental management, startups.

Jel Classification Codes: Q57, O31, M13.

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1. INTRODUCTION

The majority associate creative thinking with the arts only, while many of the most prestigious jobs in the fields of business and science require the possession of creative thinking skills. It is the mental process that we use to reach new ideas and visions and solve problems in distinctive ways. In the field of economics and in response to the pollution crises, it has become one of the issues that took on environmental, economic and social dimensions. In light of these concerns, various associations and bodies have emerged around the world calling for the preservation of the environment and making it a safe place to live for us and for the coming generations, and pressures have increased on governments and official bodies to put an end to violations that affect the environment through the enactment of laws and legislation that will ensure the safety of the environment, and take the necessary measures to regulate the relationship between man and the environment in order to ensure the fulfillment of human needs and the preservation of the environment and its natural resources and not to prejudice the right of the coming generations to natural resources. Many business organizations have tended to search for new ways to achieve their goals, taking into account environmental safety, by adopting specific and long-term strategies concerned with the principle of sustainability. Where it is not limited to cost savings and risk management, but has expanded to include environmentally friendly innovation and creativity that contribute to achieving green goals, and since the basis for startups is creativity in solving problems, the following question can be raised:

What impact does creative thinking have on greening the supply chain management in Algerian startups ?

The answer to this question is through the following sub-questions:

- What is the level of adopting creative thinking skills in the organization from the founders' point of view?
- Is there an integration of the green dimension into the supply chain management in the organization?
- What is the most influential creative thinking skill in adopting the green strategy in startups, according to its founders' opinion?

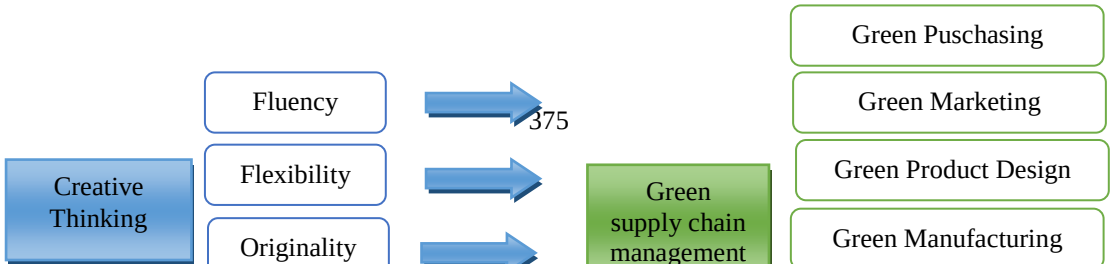
1.1. Study Hypothesis :

Through the study problem, we can identify the following main hypothesis: There is a significant statistical effect of creative thinking in greening the supply chain management in Algerian startups.

1.2. Study Sample :

The study included two variables: an independent variable consisting of four dimensions, and a dependent variable consisting of six dimensions, which can be modeled as follows:

Fig.1. Study Sample



Source: from the researchers imagination

2. Creative Thinking

2.1. Definition

Mental processes that give birth to ingenious thoughts. Reasoning that uses imagination to substitute, expand, modify, or transform the symbols, images, ideas, patterns, conditions, or elements in the world around us. Often contains an element of surprise (Fabian, 1990, p. 17). Is defined as the competence to engage productively in the generation, evaluation and improvement of ideas, that can result in original and effective solutions, advances in knowledge and impactful expressions of imagination (OECD, 2019).

Creative thinking is about vision, awareness and expression. Competency is beneficial, but not required. Avoiding the trap of having to impress people with talent is important, and it's easy to confuse this with ability. Ability is in your natural awareness and comprehension. Competency is about preparation and repetition. Is the great opera singer who forces him or herself to practise for hours each day expressing a love of music, or merely exploiting a skill? Enjoying music for the sake of it is rewarding. Rather than setting up an armoury of skills, the creative mind investigates everything it is intrigued by (Judkins, 2015, p. 87).

One of the major roadblocks to creative thinking is the assumption that there's only one right answer to any problem or opportunity that you're having. We all know that there are hundreds or even thousands of ideas that are better than the first idea that you came up with (Fox, 2008, p. 82). The best way to find a great answer or idea is to generate a large selection of possibilities to choose one of them (Fox, 2008, p. 133).

2.2. Creative Thinking Techniques

There are many creative thniking techniques, but here is the explanation of some of them:

2.2.1. SCAMPER

Is a checklist of idea-spurring questions. Some of the questions were first suggested by Alex Osborn, a pioneer teacher of creativity. They were later arranged by Bob Eberle into this mnemonic (Michalko, 2006, pp. 106-107).

SCAMPER basically aims to create numerous ideas which is expected from divergent thinking process and it provides an enjoyable environment for thinking creatively (Özyaprak,

2016, p. 33).

Every letter refers to a specific thinking process (Serrat, Knowledge Solutions, 2017, p. 313):

- **S**ubstitute : think about substituting part of the product or process for something else.
- **C**ombine : think about combining two or more parts of the product or process to make something new or to enhance synergy
- **A**dapt : think about which parts of the product or process could be adapted or how you might change the nature of the product or process.
- **M**odify or **M**agnify : think about changing part or all of the product or process, or distorting it in an unusual way.
- **P**ut to other uses : think of how you might put the product or process to another use or how you might reuse something from somewhere else.
- **E**liminate : think of what might happen if you eliminated parts of the product or process and consider what you might do in that situation.
- **R**everse or **R**earrange : think of what you might do if parts of the product or process worked in reverse or were sequenced differently.

To use SCAMPER (Michalko, 2006, p. 107):

- Isolate the challenge or subject you want to think about;
- Ask SCAMPER questions about each step of the challenge or subject and see what new ideas emerge. Asking the questions is like tapping all over the challenge with a hammer to see where the hollow spots are.

2.2.2. Brainstorming

Is a method for generating ideas in a group. It was first popularized by Alex Osborn, an advertising executive, around the 1950s. It has now become a standard technique used by companies and organizations (Lau, 2011, p. 228). According to Alex Obsorn Brainstorming is a tool for maximizing a group's creativity in problem solving. It is a conference technique by which a group attempts to find a solution for a specific problem by amassing all the ideas spontaneously from its members (Kumbhar, 2018, p. 2). One of the key goals of brainstorming is to come up with innovative thoughts or new ones. Novelty Can be defined objectively as low frequency idea from the total pool of ideas (Paulus & Putman, 2009, pp. 2-3).

2.2.3. Six Thinking Hats

In the early 1980's Dr. Edward de Bono developed a lateral thinking method of Six Thinking Hats. This technique promotes diversity of thought by using different types of thinking during discussion. It makes creative thinking part of ordinary thinking. Thinkers can switch from one metaphorical "hat" to another, representing a different mindset in a playful manner (Peng, 2019, p. 69).

The hats with different colors represent six facets of the thinking process (Serrat , 2009, p. 1) :

- The white hat : represents neutral and objective, it takes care of objective facts and numbers.

- The red hat : emotional thinking, from the point of view of emotions, feelings, and hunches, looks at a subject without trying to qualify or explain it.
- The black hat : somber thinking, serious user experience, reasoning, decision, and vigilance to analyze the challenges and concerns involved with a subject and the feasibility of ideas.
- The yellow hat : thinking sunny, positive is concerned with benefits and values.
- The green hat: represents thinking growth, fertility, intimates creative thinking and action, not decision, to produce new ideas and solutions.solutions.
- The blue hat : thinking cool, the sky above reflects on thought, metacognition (thinking about the necessary thinking), and the need to control the thinking process.

The six thinking hats clear up the confusion when emotions, logic, information, and creativity simultaneously come to mind. This paradigm encourages thinkers to rely on one form of thought at a time enabling them to think more objectively and contributing to more innovative thinking (Peng, 2019, p. 69).

2.3. Creative Thinking Skills

Some of the most important skills of creative thinking are as follows**:**

- **Fluency:** the number of ideas and ideas that can be expressed continuously in a short time (He, 2017, p. 30).
- **Flexibility:** necessary abilities for changing thinking direction or the ability to produce varied ideas (Arefi & Jalali, 2016, p. 4).
- **Originality:** refers to the number of unusual, but relevant ideas as measured by the statistical infrequency of the idea (Salemi, 2010, p. 7).
- **Elaboration**: It refers to the idea creation process through detailed elaboration that will improve interest, develop ideas and make them more interesting (Rabi & Bin Masran, 2016, p. 69).

For example: if an individual was trying to decide on what to make for dinner, he or she could come up with as many ideas for dinner (fluency), ideas that no one else would think of (originality), a list of different types of foods (flexibility), and/or a list of the different types of foods within a category of foods (elaboration) (Im, Hokanson, & Johnson, 2015, p. 136).

3. Green Supply Chain Management

Today, environmental concerns are growing due to the strong demand from global customers for eco-friendly goods. In their activities, companies are pressured to adopt green management practices to ensure economic development. In order to continue the business, environmental issue are becoming more prevalent due to rapid changes in the global industrial sector.

3.1. Evolution Process from Supply Chain Management to Green Supply Chain Management

The dynamics of supply chain management (SCM) centers around three essential factors: commodities, the suppliers and raw materials. As a consequence of global green projects, innovative approaches and principles for the study of environmental growth have

been created for pioneering businesses in developed countries. These approaches typically concentrate on three facets of an organization, which are: design of products, method of fabrication and the organization itself (Shahriarpour & Tabriz, 2017, p. 268).

The Green Supply Chain Management (GSCM) was described as introducing the "Green" aspect to SCM, affecting its relationship with the natural environment and constructing the following GSCM formula (Weeratunge & Herath, 2018, p. 58).

GSCM = Green Purchasing + Green Manufacturing + Green Marketing + Green Product Design + Reverse Logistics + Enviroment Management System.

GSCM is a method of production management that incorporates environmental requirements in the various supply chain processes. The primary goal is to ensure a minimal impact on the ecosystem during the product life cycle (Alabduljabbar, 2013, p. 58). It consists of the participation of the buying function of practices that include elimination, recycling, reuse and resource replacement. It also refers to the practice of monitoring and improving environmental performance in the supply chain (Sarkis & Dou, 2018, pp. 9-10). GSCM entails the planning, implementation, tracking and regulation of activities, techniques and resources that enable companies to become socially conscious and sustainable for the conservation of the environment through their greening process (Achillas, Bochtis, Aidonis, & Folinas, 2019, p. 2).

Greening the practices of the supply chain is typically split into two categories (Shahriarpour & Tabriz, 2017, p. 268):

- This would contribute to better collaboration of sustainability activities with manufacturers to promote the production of greener and more environmentally sustainable goods;
- Demands to boost manufacturers' environmental performance, such as gaining ISO 14000 certification or meeting a performance level.

The key distinctions between these two types of operations are that one of the categories focuses on the role of suppliers in serving consumers (with product design and consumer environmental issues) and the other focuses on internal supplier success in tandem with customer demand (to reduce risk or cost by using better environmental management supply chain).

3.2. Green Supply Chain Management Practices

The initial goal of green programs around the supply chain is to improve the supply chain's productivity by eliminating various forms of waste, using lean methods, and by using green practices to minimize the environmental effects. Such activities continue to cover inbound and outbound logistics along with reverse logistics beyond the company (Paksoy, Weber, & Huber, 2019, pp. 4-5).

3.2.1. Green Purchasing

GP is described as an environmentally friendly purchasing program that aims to ensure that goods or materials purchased follow the environmental targets set by the purchasing organization, such as reducing waste sources, encouraging recycling, reusing, reducing energy, and replacing materials. In addition to the conventional buying requirements of cost, efficiency, and distribution, GP guarantees that purchasing or SCM address the problem of

sustainability in the purchasing of inputs (Dube & Gawande, 2011, p. 4). The Illinois-based National Association of State Procurement Officials (NASPO) describes Environmentally Preferable Purchasing (EPP) or Green Purchasing as a "process of purchasing a product that when compared to competing products serving the same purpose, has a lower or decreased negative effect or increased positive effect on human health and the environment" (Gajendrum, 2017, p. 3).

3.2.2. Green Marketing

The term of “green marketing” first revealed in the late 1970s. American Marketing Association (AMA) defined it as “ecological marketing” (Yan & Yazdanifard, 2014, p. 33). Green marketing stresses the green qualities of goods and services when selling or promoting them, and highlights decreased environmental degradation. A sustainable green marketing strategy involves (Chen, Shih, Shyur, & Wu, 2012, p. 2547):

- Make good use of information and digital technology technologies;
- Reveal product and service environmental information;
- Delegate extended responsibility to producers.

It is also described as any promotional activity which highlights the environmental ethics as business fundamentals andit can perceive an advantage of switching consumer behavior towards a brand (Yan & Yazdanifard, 2014, p. 33)

3.2.3. Green Product Design

Designing products opens up opportunities to reduce the environmental impacts involved in new technologies and manufacturing processes being created. The design of green products consists of two core concepts: environmentally conscious design (ECD) and life cycle assessment (LCA) (Wibowo, Handayani, & Mustikasari, 2018, S. 656)**.** LCA is an applied impact assessment approach in which the (environmental) burdens associated with the entire products life cycle are quantified (Sala, Reale, Cristobal-Garcia, Marelli, & Pant, 2016, p. 5). ECD is a design approach that aims to yield a product whose aggregate environmental impact is as small as possible without compromising such measures as quality, cost, performance, and production feasibility (Huang, Liu, Zhang, & Sutherland, 2009, p. 1074). ECD is divided into two phases: recycling design (DFR), which makes it easier to make smarter choices for material preference, and disassembly design (DFD), which is used by organizations to specify some product design requirements that minimize structural complexity by minimizing the number of components, maximizing the use of popular products (Wibowo, Handayani, & Mustikasari, 2018, p. 656).

3.2.4. Green Manufacturing

Green manufacturing is a term used to describe manufacturing practices that do not harm the environment during any part of the manufacturing process. It stresses development practices that do not pollute the atmosphere or damage customers, workers, or other community members (Belekar, 2017, p. 2667). GM involves transformation of industrial operations in three ways: using green energy, developing and selling green products and employing green processes in business operations (Bhattacharya, Jain, & Choudhary, 2011, p. 5).

Green Products involves the minimization of the adverse effects of the materials used in the product or its packaging, such as the avoidance of the use of radioactive materials, the minimization of the use of non-renewable materials and the use of renewable materials in compliance with their replenishment rate (Baines, Brown, Benedettini, & Ball, 2012, p. 65). We may define green products by: products those are originally grown, recyclable, products with natural ingredients and non-toxic chemical, products that have eco-friendly packaging i.e. reusable, refillable containers etc (Rajasekaran & Gnanapandithan, 2013, p. 628).

3.2.5. Reverse Logistics and Recycling

Reverse logistics represent the mechanism by which companies recover value from by-products by recycling, reusing and minimizing the amount of materials used. In this sense, green management calls for enhancing environmental efficiency along the supply chain to promote the organization's overall environmental mission (Alabduljabbar, 2013, p. 59). Whereas, recycling is reusing materials from used products or components to prolong the life of a product or material. The materials can be used to produce original products and components if their quality is high. Otherwise, the materials can be used to produce other products. Not all items can be reused, refurbished and repaired, but their components can be recycled and restored (for energy). Examples are milk bottles, soft drink bottles, etc (Grant, Trautrims, & Wong, 2017, pp. 187-201).

3.2.6. Environment Management System (ISO14001)

EMS is a method for monitoring the environmental implications of the operations of an organisation. It gives a systematic approach to the preparation and execution of initiatives to protect the environment (Khanna, Bhutiani, & Matta, 2009, p. 11). ISO14001 is an environmental management system standard. Organizations must have a process in place to understand, prioritize and address their environmental effects in order to obtain accreditation (Walker, Pitt, & Jha-Thakur, 2007, p. 56).

4. Standard Study:

The study included a group of Algerian green startups in 2021, surveying a sample of 100 founders of these institutions, based on structural equation modeling to measure the causal effects of the creative thinking variable on greening the SCM.

4.1. Study Tool and the Standards Adopted in It:

The questionnaire was adopted as a tool for data collection. It was divided into two main parts. The first was devoted to the demographic study of the study sample, while the second was divided into two main axes. The first measures the creative thinking variable in its four dimensions, and it consists of 16 items, while the second measures the GSCM variable, and consists of 24 items through Six dimensions, based on two previously used scales, characterized by stability and high credibility, with some modifications to the paragraphs to serve the directions of this study. As for the scale of creative thinking, it was built based on the study (Zroukhy & Salam, 2018), and for the GSCM scale, it was based on the study (Al-Taweel & Al-Abedy, 2018), and Likert five-point scale was used to measure the study items. Then the results of the data obtained from the questionnaire were unloaded and analyzed using SPSS and AMOS programs, and the following statistical tests were used:

- Frequencies and percentages to describe the study sample;

- Mean and standard deviation to describe the answers;
- Cronpach's Alpha test for resolution stability;
- Structural equation modeling for testing how well the model matches the sample data used.

4.2. Scale Stability:

The reliability of the statements included in the questionnaire must be ensured, so that the results are more realistic, and to measure them, Cronbach's Alpha is used, which is shown in the table:

Table 1. Cronbach's alpha coefficient to measure the stability of the form

Variables	Dimensions	Number of Itms	Cronbach's Alpha
Creative Thinking Dimensions	**Fluency**	4	0.611
	Flexibility	4	0.640
	Originality	4	0.620
	Elaboration	4	0.618
Total Axis		16	0.650
GSCM		24	0.790
The grand Total Form		40	0.804

Source: The outputs of SPSS V26 program

It is clear from the results that the value of Cronbach's alpha for the entire questionnaire is equal to 0.804, and therefore the resolution is stable. If it is returned to the survey, the response will be stable at 80.4%, which is a good percentage. Also, all variable values are greater than 0.6, which is statistically acceptable, which indicates the validity and reliability of the study tool and it can be relied upon in our applied study, and that the variables are characterized by reliability.

4.3. Factorial validity:

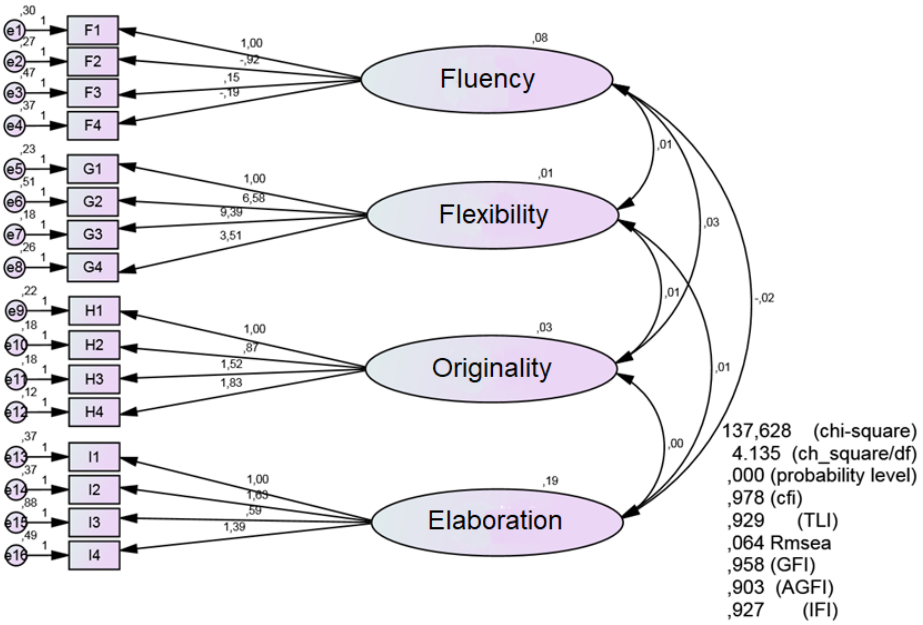
The confirmatory factor analysis comes according to the conformity indicators to judge the extent to which the theoretical model matches the field data, including:

Table 2. Conformity quality indicators to the structural modeling equation

Index	Perfect Field
Chi-square	Minimal, statistically non-significant
Chi-square/df	Less than 5 is accepted and a good match
Comparative Fit Index (CFI)	More than 0.95
Tucker–Lewis index (TLI)	More than 0.9
Root Mean Square Error of Approximation (RMSEA)	0.05 < RMSEA < 0.1
Goodness of Fit Index (GFI)	More than 0.9
Adjusted Goodness of Fit Index (AGFI)	More than 0.9
Bentler-Bonett Normed Fit Index (NFI)	More than 0.9
Incremental Fit Index (IFI)	More than 0.9

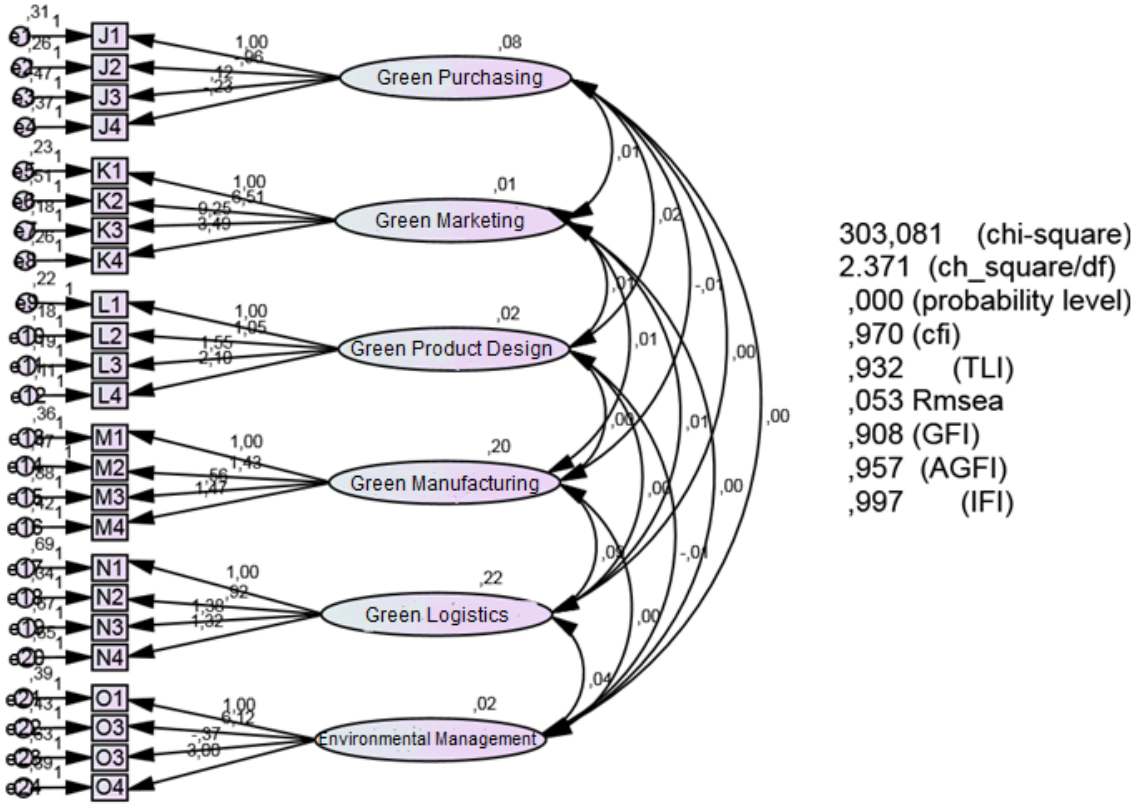
Source: (Sahraoui & Bouselb, 2016)

Fig.2. Measurement model for the creative thinking variable



Source: The outputs of AMOS V26 program

Fig.3. Measurement model for the GSCM variable



Source : The outputs of AMOS V26 program

Through the tests of power for reliability and validity of the quality of match indicators extracted, and shown in the above two figures, which shows that the two variable models had acceptable values of the indicators of quality of match compared to what is shown in Table 2, which were all greater than 0.90. We also find that all model estimates are significant below the P<0.001 level. Thus, the model is validated, has strength, is well-matched, and can be relied upon in testing the proposed study model.

4.4. Results of the Study: From testing the hypotheses and displaying the achieved results.

4.4.1. Descriptive Analysis of the Study Variables:

Table 3. Distribution of study members according to demographic variables

Term	Information	Percentage	Term	Information	Percentage
Age	18 – 24 years	48	**Number of Employees**	From 1 to 9	83
	25 – 34 years	47		From 10 to 49	17
	35 years and over	5		From 50 to 250	0
Job Tittle	Founder	100		More than 250	0
	Others	0	**Gender**	Male	68
				Female	32

Source: The outputs of SPSS V26 program

It appears from the table above that the percentage of males in the sample is 68%, which is greater than the percentage of females 32%, due to the fact that women in Algeria tend to work more in the government sector, and most of the study members are between the ages of 18 – 24 years, with a percentage of 48% and 25 - 34 years at 47%, which are close proportions, which means that young people are racing in the field of startups. As for the job title, the study targeted the founders, as they are responsible for setting the enterprise's strategy. In addition, we find the number of workers ranging from 1 to 9, at 83% This indicates that most of the startups under the study are small in size due to their modernity, and their lack of expansion.

In order to answer the questions of the study, the mean and standard deviation of the axes dimensions, the total mean and the total standard deviation of the axes were calculated.

Table 4. The mean and standard deviation of the study dimensions

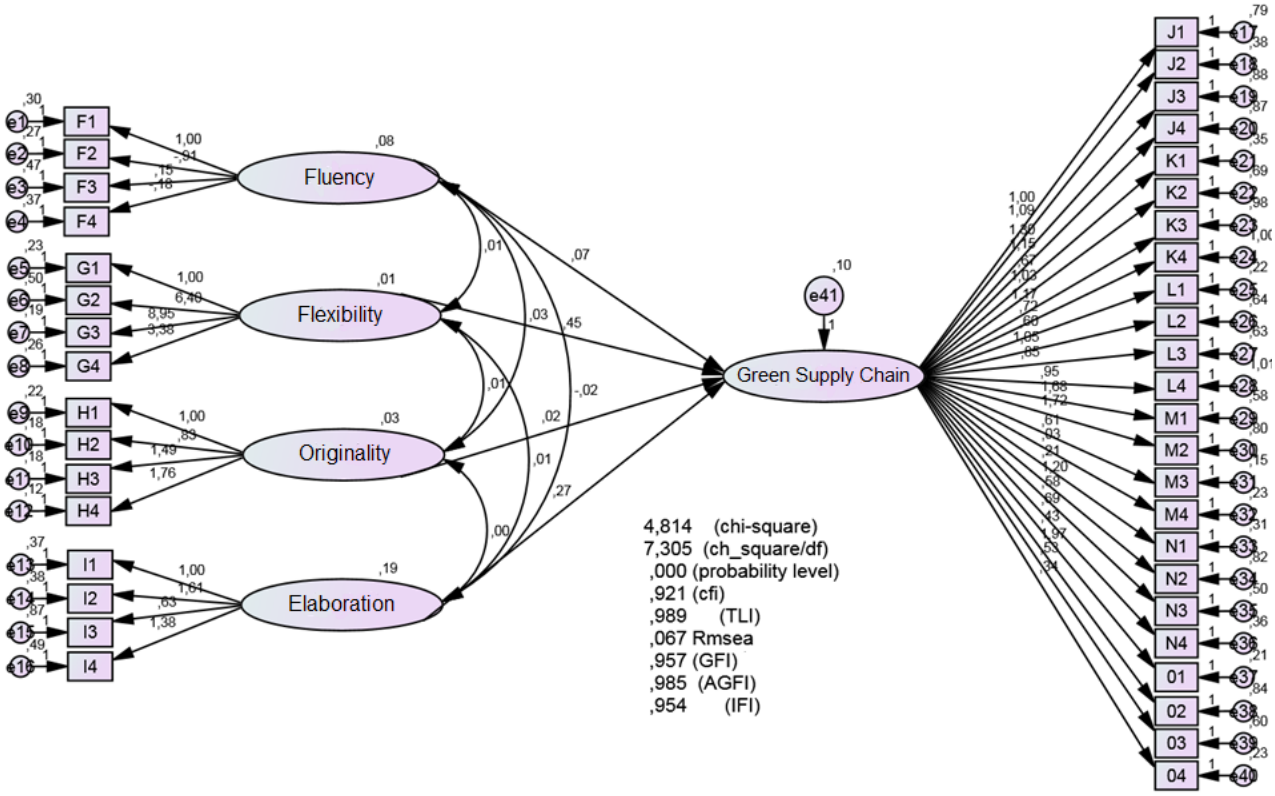
Variables	Dimensions	Mean	Variance	Direction of Question Answering
Creative Thinking	Fluency	4.3	.39375	Strongly Agree
	Flexibility	4.105	.50125	Agree
	Originality	4.6075	.2305	Strongly Agree
	Elaboration	3.885	.8115	Agree
GSCM	Green Purchasing	2.9325	.8945	Neutral
	Green Marketing	3.8125	.8665	Agree
	Green Product Design	3.9325	.7265	Agree
	Green Manufacturing	3.7825	.62775	Agree
	Reverse Logistics and Recycling	4.1625	.57275	Agree
	Environmental Management	4.205	.6065	Strongly Agree

Source: The outputs of SPSS V26 program

It is clear from the results that the dimensions of creative thinking range in average between 4.6 and 3.8 and fall into the first and second category of the Likert five-point scale, which means that the sample members agreed on the existence and adoption of all creative thinking processes, as well as for the GSCM axis, its average dimensions ranged between 3.7 and 4.2 It falls in the first and second category, except after green purchase, which was 2.9, and falls in the third category, which means that there is no green purchase in the study sample institutions. In addition, the standard deviations were between medium and weak, which indicates that the founders agree that creative thinking has contributed to greening the SCM within their startups.

4.4.2. Testing the impact of creative thinking on greening the practices of the supply chain: This is demonstrated through the following figure:

Fig.4. The structural model of the impact of the creative thinking dimensions on the GSCM



Source: The outputs of AMOS V26 program

The model obtained high matching indicators, all of which were greater than 0.9, which is statistically significant. We also note that creative thinking skills have varying effects on the GSCM, which is shown in the following table:

Table 5. The results of estimating the direct impact relationships between the dimensions of creative thinking on the GSCM.

Independent Variable		Dependent Variable	Estimate	Regression Coefficient	Critical Values	P- value
Fluency	→	GSCM	0.074	0.409	0.181	0.856
Flexibility	→	GSCM	0.454	1.072	0.423	0.672
Originality	→	GSCM	0.023	0.460	0.050	0.960

Elaboration	→	GSCM	0.267	0.155	1.721	0.085

Source: The outputs of AMOS V26 program

From the estimation results, we notice that there is a positive effect varying between creative thinking skills and the GSCM, as the flexibility dimension had the greatest impact on greening the supply chain with a rate of 0.454, followed by elaboration with a rate of 0.267, then fluency with 0.074, and finally originality with a rate of 0.023, which means its contribution to the adoption of the strategy. This enables us to write regression equation for the model as follows:

GSCM = 0.454 Flexibility + 0.267 Elaboration + 0.074 Fluency + 0.023 Originality

Conclusion:

The growing environmental concerns due to the strong demand from global customers for environmentally friendly goods, and to pressure the companies in their activities to adopt green management practices to ensure economic development, and in order to continue working, the environmental issue is becoming more prevalent due to the rapid changes in the global industrial sector. Thus, creativity in finding environmental solutions has become a necessity. Therefore, most of the modern startups, which were founded mainly on creativity, tended to integrate the green operations into their strategies in order to preserve the environment on the one hand, and achieve economic gains on the other.

The study founded:

- After converting the axes of the study into a model according to the method of modeling structural equations and the AMOS program, it passed all the tests of structural validity and the required quality of conformity, so the value of the indicators was acceptable or ideal, which means that the model was accepted both structurally and statistically;
- All creative thinking skills had a positive significant effect on greening the SCM with varying rates;
- The skill of flexibility in creative thinking is the most influential dimension on greening the SCM, according to the founders;
- Through the results, it is clear that creative thinking contributed to greening the SCM in Algerian startups to make them more adaptable to the current environmental and economic conditions.

Accordingly, it can be suggested to the institutions:

- Constant search for new and diverse ideas to ensure the continuity and expansion of the institution;
- Creating an atmosphere conducive to creativity and teamwork within the organization to reach innovations that serve the green product;
- Spreading environmental awareness in the internal and external environment of the organization to facilitate adaptation to green operations;
- Encouraging investment in environmentally friendly technologies to find the best ways to identify alternative resources that have the least impact on the environment;
- Develop future plans for green orientation in its future environmental strategies,

especially with regard to procurement operations;

- Seeking to obtain ISO 14000 environmental certificates that help maintaining the environment and move towards sustainable development.

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