

# The Effect of Lean Supply Chain Activities on Entrepreneurial Performance: An Exploratory Research to Opinions Sample of Managers in Diyala State Company for Electrical Industries

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**Keywords:** Lean Supply Chain Activities, Entrepreneurial Performance, Organization Performance, Diyala State Company for Electrical Industries.

**Abstract:** The research aims to identify the effect of Lean supply chain activities as an independent variable and Entrepreneurial performance as a dependent variable. In order to achieve this, the research depends on the descriptive-analytical approach, which includes a sample of the research covers (84) managers distributed on many administrative levels (general managers, managers of departments, managers of sections, and managers of units) at the Diyala State Company for Electrical Industries. The research uses the questionnaire as a primary tool. The results are analysed using several statistical tools via two programs: (AMOS V.23) and (SPSS V.24) to reach the related results. In addition, (Microsoft Excel 2010) program is also used to analyse the properties of the selected samples. In addition to using the (MAXQDA) program in the preliminary research to diagnose the problems experienced by the company, the study seeks to test a number of the primary and secondary assumptions relevant to the connection and effect between the study variables in order to answer the questions related to the study's problem.

## 1 INTRODUCTION

Organizations currently face significant and changing challenges, pushing them to make complex transformations to keep up with these challenges by changing the quality of their operations to adapt to everything new. They strive to win the competition to maintain their position and reputation in the market, as well as to uncover existing and potential opportunities in the competitive environment and invest these opportunities to achieve pioneering performance in those markets. Therefore, such organizations have acquired the characteristic of entrepreneurship in the business world through innovative and new methods that enable them to outperform competitors by employing creative and innovative processes and accepting risks, as well as possessing proactive and competitive qualities to ensure their advancement in entrepreneurial performance. Hence, it is essential to implement lean supply chain activities, which are considered an effective competitive weapon in the contemporary business environment. Moreover, they are considered one of the modern methods organizations adopt to

stay and compete due to their ability to provide high-quality and low-cost products by addressing waste in all organizational activities. The idea of the current research formed from this standpoint is to take upon itself the presentation of these topics that have an influential and direct role in achieving organizations' goals despite their challenges. By referring to previous Arabic and foreign literature, it was found that no research dealt with the current research variables in a single hypothetical model where the independent variable is lean supply chain activities, and the dependent variable is entrepreneurial performance, which indicates the existence of a knowledge gap in determining the relationship between these variables and their dimensions. Since the industrial environment was the actual birth of the application of the lean supply chain and its strategic orientations, this research focused on a sample from the Iraqi industrial sector, which is Diyala State Company for Electrical Industries, one of the formations of the Iraqi Ministry of Industry, which has faced and is still facing a significant change in its environment, which requires it to reconsider the means and methods related to its business to be

compatible with the environment and invest in lean supply chain activities to reflect correctly on entrepreneurial performance. In addition, the researcher identified the field problems in Diyala State Company for Electrical Industries, which was chosen as a field for applying the research, as he relied on preliminary (exploratory) research in diagnosing those problems the company suffers from. From here, the research problem emerged, which seeks to answer a fundamental question: (Does the company in the field of research realize the importance of lean supply chain activities and entrepreneurial performance in light of a rapidly changing competitive environment?). This research aimed to answer the problem questions by analyzing and interpreting the nature of the correlation and impact relationship between lean supply chain activities and their dimensions in entrepreneurial performance. The importance of the research was embodied in cognitive and applied contributions to direct the company to adopt lean supply chain activities in achieving its entrepreneurial performance. A unique form was prepared for this purpose and distributed to the population of (84) managers at several administrative levels (general manager, assistant general manager, department manager, division officials, and unit officials) in Diyala State Company for Electrical Industries. We used ready-made statistical programs (SPSS V.24 and AMOS V.23) to analyze data, test hypotheses, and extract results. To give a clear picture, we divided the research into methodology, including the research problem, its importance, objectives, and hypotheses. The theoretical framework addressed the conceptual framework of the research variables.

## 2 RESEARCH METHODOLOGY

Due to constantly changing environmental pressures and challenges, Iraqi organizations generally suffer in many aspects, whether in their performance methods or service delivery. This increases the difficulty of reaching their goals. The research problem was embodied in the need of Diyala State Company for Electrical Industries to practice agility in its supply chain activities to reduce waste and eliminate all useless stages and steps along the supply chain, as well as reduce the time required to complete tasks and achieve customer desires promptly, and reflect this in the company's entrepreneurial performance. In light of this, the researcher can express the research

problem by posing the central question: (Does the company in the research field realize the importance of lean supply chain activities and entrepreneurial performance in a rapidly changing competitive environment?) and the following questions branch from this question:

- 1) What is the level of interest in adopting lean supply chain activities in the company under study?
- 2) What is the level of interest in entrepreneurial performance in the company under study?
- 3) What is the relationship between lean supply chain activities and entrepreneurial performance in the company under study?
- 4) How do lean supply chain activities impact entrepreneurial performance in the company under study?

The cognitive importance of the research is embodied through presenting theoretical and knowledge frameworks for essential topics in administrative thought, which increases their conceptual clarity. The research derives its importance from the results it reached, which determine the nature of the relationship and impact between lean supply chain activities and the company's entrepreneurial performance, and the extent to which Diyala State Company for Electrical Industries, the research community, benefits from these results in building its plans and strategies.

Based on the research problem and objectives, the researcher developed a hypothetical model illustrating the correlation and influence relationships between the independent and dependent variables. Figure 1 shows the correlation and influence relationship between the independent variable of lean supply chain activities and the dependent variable of entrepreneurial performance.

### 2.1 Hypothetical Research Model

The main and sub-hypotheses of the research were formulated in light of the hypothetical research plan, in line with the field aspect of both lean supply chain activities and entrepreneurial performance, which will be subject to testing, analysis, and statistical processing to prove their validity or lack thereof. The first main hypothesis (H1) is that there is a statistically significant correlation between lean supply chain activities and entrepreneurial performance. The second main hypothesis (H2) is that lean supply chain activities statistically affect entrepreneurial performance.

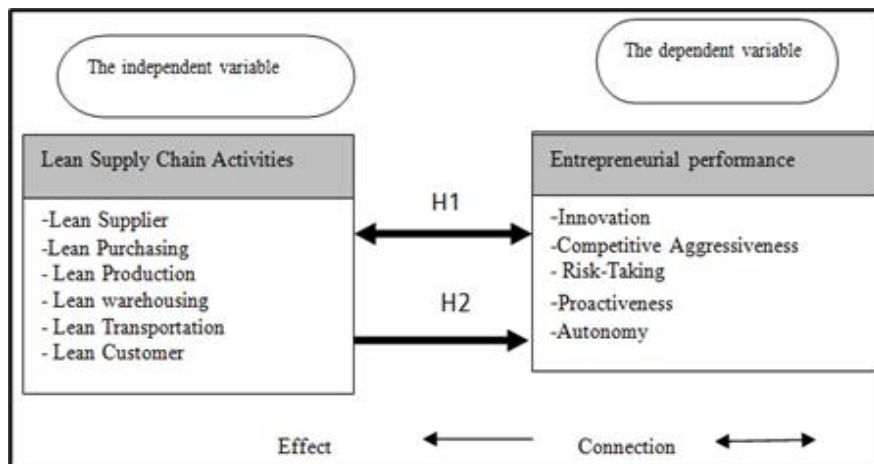


Figure 1: Hypothetical diagram of the study.

## 2.2 Research Population and Sample

To meet the requirements of the applied aspect of the research and achieve its objectives, it was necessary to choose a research population that matches and aligns with what it seeks to achieve. To test the hypotheses in the field within an Iraqi work environment, the researcher chose Diyala General Company for Electrical Industries as the research site. A purposive sample of administrative levels in the researched company was selected, representing the entire study population due to its essential role in its success. The sample size was 84 individuals. The questionnaire was distributed to the entire sample, and the number of retrieved and valid questionnaires was 84. The researcher exerted great effort in following up with managers and officials from the research sample until they completed filling out the questionnaires in full.

## 3 THEORETICAL ASPECT

### 3.1 Lean Supply Chain Activities

Al-Neama and Al Mashhour (2017) indicated that when lean concepts are adopted in an organization, whether industrial or service, the supply chain becomes not just a supply chain but a chain that adopts flexibility principles in all its areas and activities through the elimination of all forms of waste, becoming the most important factor in the success of industry and services organizations [1]. The first to introduce the term “lean” to supply chains was Richard Lamming, a researcher at the University of Manchester in 1993, who mentioned that lean

supply requires “something beyond partnership.” Leanness is considered a philosophy that finds its place in the supply chain and plays a major role in the operation of the supply chain [2]. Rossini et al. (2021) added that the Lean Supply Chain (LSC) can be described as a group of organizations working together to reduce waste through effective pull, increase flexibility, reduce costs, and improve the quality of supply chain activities from the end customer’s perspective. They also added that the organization should focus on applying lean supply chain principles and practices at the strategic level across the supply chain to achieve its objectives [3].

The application of the lean supply chain aims to enable the organization to remove all activities that do not add value to it, reduce the time required for setting up and assembling machines, as well as enhance the performance of the production system because it provides economical production in small quantities, in addition to reducing costs, increasing profits, and production flexibility [4]. In the same context, the main goal of implementing the lean supply chain is to enable the organization to improve its operations and maintain its competitive position in the market through [5], [6]:

- Customer satisfaction;
- Improving flow;
- Improving quality;
- Reducing costs;
- Improving delivery;
- Reducing inventory.

The lean supply chain is one of the modern methods organizations adopt to survive and compete due to its ability to provide high-quality products at low costs by addressing waste in all organizational activities [7]. Since the supply chain extends from

raw materials to final products delivered to end customers, the lean supply chain management function is essential in enhancing relationships with partners along the supply chain. The organization's success in delivering value to customers depends on the performance of the entire supply chain compared to competitors' supply chains [8].

### 3.2 Entrepreneurial Performance

Entrepreneurial performance is a process that includes orientation towards excellence, in line with creativity, proactiveness, competitiveness and risk-taking, exploiting valuable opportunities, achieving distinguished returns and meeting customer needs and desires that lead the organization towards distinction and efficient utilization of resources. Thus, entrepreneurial performance is the degree to which an entrepreneurial organization can exceed expectations in meeting customer needs [9]. Entrepreneurial performance is associated with developing new products, identifying market opportunities, creating a modern environment, establishing good investment relationships, and being prepared to interact with external environmental factors.

The challenge facing organizations today is to achieve a sustainable competitive advantage that emerges through taking the initiative in implementing new ideas and investing scarce resources in a way that preserves them from waste and misuse. The importance of entrepreneurial performance lies in being one of the approaches aimed at organizational excellence by developing its capabilities and exploiting the competitive resources that help it adapt to rapidly changing opportunities and meet future customer needs and requirements. The importance of entrepreneurial performance is manifested in enabling the organization to attain a position that makes it the focus of other organizations to emulate, as it is an inevitable result of its overall innovations thanks to achieving its organizational and strategic goals [10], [11]. There are a set of reasons that encourage organizations to pay attention to entrepreneurial performance:

- 1) It enhances the value of creativity in the work environment, allows employees to benefit from their skills, and promotes a culture that encourages entrepreneurial performance.
- 2) It helps organizations deal with threats and risks from other organizations in the competitive environment.
- 3) Increasing organizations' ability to discover new opportunities to enhance and develop

competitive advantage helps them overcome obstacles and challenges in a dynamic environment where opportunities appear in small amounts and limited resources.

- 4) They are developing managers' or employees' capabilities to enable them to make the organization more distinguished in performance compared to other competing organizations.
- 5) Supporting and implementing effective projects that play a significant role in achieving sustainable development for the organization and emphasizing the achievement of long-term goals enhances the organization's position and obtains a large market share.
- 6) Contributing to economic development by generating new ideas and converting them into profitable risk, so entrepreneurial activities are not limited to developing creativity but also provide employment opportunities, increase competition, and help the organization find opportunities and accomplish new projects and businesses through (product or process innovation, market development, and adoption of strategic renewal) [12].

From the previous, the researcher concludes that entrepreneurial performance is an important source and effective tool for organizations to achieve sustainable competitive advantage. It is considered the main weapon for facing market challenges and competing organizations by exploiting opportunities and adopting a proactive approach to achieving the organization's entrepreneurial goal.

## 4 PRACTICAL ASPECT

### 4.1 Questionnaire Data Tests

#### 4.1.1 Personal Characteristics of the Research Sample

There are a set of unique characteristics for the individuals in the research sample related to the managers included in the questionnaire for the section on general identification (personal) information, which are (gender, age, job position, years of service, and educational qualification) to identify the characteristics of the research sample and the level of experience and knowledge to answer the questionnaire items objectively and accurately. As shown in Table 1, a description of the personal data of the research sample.

Table 1: Distribution percentages of the sample according to gender.

Gender	Number	% Percentage
Male	62	73.8
Female	22	26.2
Total	84	100

Distribution of the sample according to gender. Table 2 shows that the percentage of males (73.8%) is higher than the percentage of females (26.2%) in the research sample, which indicates that the company relies more on males. This is attributed to the purely professional engineering specializations for positions within the company. Table 2 shows the distribution percentages of the sample according to age categories.

- Face validity. The questionnaire was presented to 14 arbitrators from various specializations in business administration. The research variables took their observations and changes into account. After modification, the research included 61 items.
- Reliability measure of the questionnaire using Cronbach’s alpha coefficient, which is one of the most common reliability measures in. The value of Cronbach’s alpha is positive, ranging from 0 to 1, and the authors have a consensus that the acceptable value is greater than or equal to 0.60. The results of the questionnaire demonstrated its validity and reliability in the variables of lean supply chain activities and entrepreneurial performance. Table 3 shows the Cronbach’s alpha coefficient for the reliability and validity of the questionnaire scale.

The results obtained in Table 3 show that all Cronbach’s alpha values are acceptable as they are greater than (0.60), ranging between (0.775-0.877) for the variables of lean supply chain activities and entrepreneurial performance. The overall value for this scale is (0.831). According to this high value, it is clear that the questionnaire is valid and reliable in its variables.

- Testing for Normal Distribution Using Skewness and Kurtosis Values. The standard distribution test determines the data distribution using statistical methods: skewness and Kurtosis values. Table 4 shows the average distribution test for the research data using kurtosis and skewness.

Table 4 shows that all the skewness and kurtosis values for the research data are within the standard limit of ( $\pm 1.96$ ). This confirms that data distribution for all dimensions of the research variables is usually

distributed. Statistical Descriptive Analysis of Research Variables Descriptive Analysis of Sample Responses for the Independent Variable: Lean Supply Chain Activities.

Table 4 summarizes the ranking of importance levels for the dimensions of the independent variable (lean supply chain activities), with an average of (3.95), which is higher than the hypothetical means of (3). This indicates that the responses of the research sample individuals for this variable mostly tended to show that lean supply chain activities were clear and understandable for the research and continuously work to raise the level of entrepreneurial performance appropriately through its dimensions (lean supplier, lean purchasing, lean production, lean storage, lean transportation, and lean customer). The standard deviation of (0.818) indicates a moderate degree of dispersion between the responses of the research sample individuals for the dimensions of the independent variable. The closer the standard deviation of the answers, the smaller the deviation and the less dispersion. A coefficient of variation of (20.71) confirms the absence of differences between the responses of the research sample individuals for the independent variable. The ranking of importance for each dimension of the lean supply chain activities variable shows that (lean supplier) came in first place, while lean purchasing came in last place (25.10).

Table 5 summarizes the ranking of importance levels for the dimensions of the dependent variable (Entrepreneurial Performance), which reached an average of (3.71), which is higher than the hypothetical mean value of three. This indicates that the responses of the research sample individuals for this variable mostly tended to show that entrepreneurial performance was clear and understandable for the research, and we continuously work to raise the level of entrepreneurial performance appropriately through its dimensions (Innovation, Competitive Aggressiveness, Risk-Taking, Proactiveness, Autonomy).

The standard deviation recorded (0.824) indicates a moderate degree of dispersion between the responses of the research sample individuals for the dimensions of the dependent variable. The smaller the standard deviation, the closer the answers are and the less dispersion. A coefficient of variation of (22.22) confirms that there are no differences between the responses of the research sample individuals for the independent variable. The ranking of importance for each dimension of entrepreneurial performance shows that (Autonomy) came in first place, while (Risk-Taking) was in the last place. Testing correlation and influence hypotheses for research

variables. Testing correlation hypotheses between research variables They determine the type and strength of the relationship between the independent variable (lean supply chain activities) and the dependent variable (entrepreneurial performance) through the correlation coefficient (r) value. There are two types of correlation: (positive), where both variables move in the same direction, and (negative), where variables move in opposite directions. The correlation coefficient value ranges between ( $\pm 1$ ) to determine the correlation strength between the independent and dependent variables. A positive value close to (+1) indicates a strong positive relationship, meaning a solid correlation. A negative value close to (-1) indicates a strong negative relationship and a strong correlation. A value close to (zero) means no correlation between the variables.

There are two levels for accepting the correlation coefficient and hypothesis: the first at a confidence level of (95%) and significance level of (0.05), and the second at a confidence level of (99%) and significance level of (0.01). If it is higher than (0.05) or lower than the 95% confidence level, the relationship is weak, meaning the hypothesis will be rejected due to a lack of relationship between variables. The rank correlation coefficient (Spearman's Rho) was used, which is a statistical indicator aimed at measuring the correlation between two descriptive variables, to test the first central hypothesis (H1), which states (There is a statistically significant correlation between lean supply chain activities and their dimensions in entrepreneurial performance). This branches into sub-hypotheses. The following are the results of the Pearson correlation coefficient.

Table 2: Cronbach's alpha coefficient for reliability and validity of the questionnaire scale.

Variables	Alpha Cronbach value $\alpha$	Reliability = coefficient Alpha $\sqrt{\alpha}$	Number of paragraphs
Lean Supplier	0.820	0.906	6
Lean Purchasing	0.825	0.908	6
Lean Production	0.849	0.921	6
Lean Warehousing	0.830	0.911	6
Lean Transportation	0.862	0.928	6
Lean Customer	0.785	0.886	6
Lean Supply Chain Activities	0.840	0.916	36
Innovation	0.822	0.907	5
Competitive Aggressiveness	0.775	0.880	5
Risk-Taking	0.838	0.915	5
Proactiveness	0.877	0.936	5
Autonomy	0.782	0.884	5
Entrepreneurial Performance	0.876	0.936	25
Total	0.896	0.946	61

Table 3: Normal distribution test for research data using kurtosis and skewness.

Research Variables	Dimensions	Skewness	Kurtosis
Independent Variable Lean Supply Chain Activities	Lean supplier	-0.992	0.601
	Lean purchasing	-0.353	-0.554
	Lean production	-0.331	0.293
	Lean storage	-0.002	-0.521
	Lean transportation	-0.615	0.997
	Lean customer	-0.222	-0.362
The dependent variable Entrepreneurial performance	Innovation	-0.642	0.356
	Competitiveness	-0.243	-0.276
	Risk-taking	-0.936	1.021
	Proactiveness	-0.798	1.033
	Autonomy	-0.528	1.054

Table 4: Mean, standard deviation, and coefficient of variation for the independent variable and its dimensions.

Paragraphs	Independent variables	Mean	SD	C.V %	Importance
X1	Lean supplier	4.03	0.737	18.29	First
X2	Lean purchasing	3.96	0.994	25.10	Sixth
X3	Lean production	3.94	0.841	21.35	Fifth
X4	Lean warehousing	3.86	0.804	20.83	Fourth
X5	Lean transportation	3.96	0.747	18.84	Second
X6	Lean customer	3.97	0.786	19.80	Third
X	Lean supply chain activities	3.95	0.818	20.71	n=84

Table 5: Mean, standard deviation, and coefficient of variation for the dependent variable and its dimensions.

Paragraphs	The dependent variable and its dimensions	Mean	Standard Deviation	Coefficient of Variation %	Importance
Y1	Creativity	3.72	0.897	24.11	Fourth
Y2	Competitive aggressiveness	3.50	0.816	23.31	Third
Y3	Risk-taking	3.42	0.877	25.64	Fifth
Y4	Proactiveness	3.95	0.813	20.58	Second
Y5	Autonomy	3.94	0.718	18.22	First
Y	Entrepreneurial performance	3.71	0.824	22.22	n=84

## 5 CONCLUSIONS

The study concludes that the company’s purchasing, storage, and supply chain operations do not yet achieve the required level of efficiency, mainly due to limited use of modern electronic systems and weak integration with suppliers. Although certain lean production practices are applied, significant inefficiencies remain in procurement, warehousing, and transportation processes, which negatively affect operational efficiency, cost control, and responsiveness to production requirements.

Moreover, the insufficient implementation of lean supply chain activities across operational stages limits the organization’s ability to reduce waste, optimize resource utilization, and enhance entrepreneurial performance. The lack of advanced logistics systems and modern transportation technologies further reduces the company’s responsiveness to changes in production demands and market conditions.

To address these issues, the company should strengthen its procurement system by adopting electronic purchasing platforms and developing long-term partnerships with reliable suppliers based on cost, quality, and delivery performance. Greater attention should also be given to lean inventory management practices to reduce costs and eliminate waste. In addition, upgrading transportation systems and adopting modern logistics technologies would improve material flow, reduce delays, and enhance overall operational efficiency.

## REFERENCES

- [1] A. Z. Al-Nama and A. H. Al-Mahshoul, “Evaluation of the reality of the characteristics of the agile supply chain: An exploratory study of the views of administrative leaders in the State Company for Ready-to-Wear Industry in Mosul,” *Tikrit Journal of Administrative and Economic Sciences*, vol. 4, no. 40, pp. 129–146, 2017.
- [2] S. Chopra and P. Meindl, *Supply Chain Management: Strategy, Planning, and Operation*, 6th ed. Pearson Education Limited, 2016.
- [3] M. Rossini, J. Daryl, and K. Kundu, “Lean supply chain management and Industry 4.0: A systematic literature review,” *International Journal of Lean Six Sigma*, vol. 1, no. 3, pp. 1–12, 2021. [Online]. Available: <http://dx.doi.org/10.1108/IJLSS-05-2021-0092>
- [4] Z. A. Mohammed, “The effect of developing the lean product on the lean supply chain: A field study for the Light Industries Company,” *Information Retrieval and Web Search*, vol. 18, pp. 380–405, 2021, doi: 10.14704/WEB/V18SI02/WEB18107.
- [5] P. Ugochukwu, “Lean in the supply chain: Research and practice,” Master’s thesis, Dept. Management, Linköping Univ., 2012.
- [6] B. Cvetić, D. Vasiljević, J. Novaković, and A. Đorđević, “Lean supply chain: Take an opportunity to do more with less,” *Technical Gazette*, vol. 15, no. 2, pp. 275–281, 2021. [Online]. Available: <https://doi.org/10.31803/tg-20210429120854>
- [7] K. Hezbon, “Lean supply chain management and operational performance of Almasi Beverages Company Limited,” Master’s thesis, Univ. Nairobi, 2016.
- [8] P. Kotler, G. Armstrong, and O. Opresnik, *Principles of Marketing*, 17th ed. U.S.A., 2018.

- [9] E. T. Maziriri and A. Chivandi, "Modelling key predictors that stimulate the entrepreneurial performance of small and medium-sized enterprises (SMEs) and poverty reduction: Perspectives of SME managers in an emerging economy," *Acta Commercii*, vol. 20, no. 1, pp. 1–15, 2020. [Online]. Available: <https://doi.org/10.4102/ac.v20i1.773>
- [10] A. M. A. Al-Adwani and A. A. Muhammad, "Business incubators: Organizations, entrance to transformation towards entrepreneurial performance," *Journal of Economic and Administrative Sciences*, vol. 18, no. 69, pp. 76–94, 2012.
- [11] R. Wiese, L. G. Heyns, and N. M. Pisa, "The integration of lean, green and best practice business principles," *Journal of Transport and Supply Chain Management*, vol. 9, no. 1, pp. 1–10, 2015. [Online]. Available: <https://hdl.handle.net/10520/EJC179678>
- [12] T. Dundon, A. Wilkinson, M. Marchington, and P. Ackers, "The meanings and purpose of employee voice," *The International Journal of Human Resource Management*, vol. 15, no. 6, pp. 1150–1171, 2004. [Online]. Available: <https://doi.org/10.1080/095851904100016773359>