

The Impact of Lean Thinking on Strategic Planning in Industrial Companies in Jordan from the Upper and Middle Management: A Perspective Study

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Abstract: The study aimed to identify the impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective. The study sample was chosen randomly sample and consisted of (320) managers in upper and middle management positions in industrial companies in Jordan .The questionnaire, developed in light of previous studies and information on the theoretical framework, used a primary tool in collecting data and information and analyzed those using descriptive and inferential statistical methods. The results revealed that the degree of implementation for lean thinking and strategic planning in industrial companies in Jordan, from the upper and middle management perspective, was high for both variables. Furthermore, results showed an impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective.

Keywords: Lean Thinking, Strategic Planning, Industrial Companies, Jordan.

1 Introduction

Continuous competition and focus on profit urge companies to achieve the best performance at low costs, which can be achieved if they exclude their losses, free time, and surplus resources and continue developing to keep pace with the changing market [1]. This regular but still great idea is the basis of one of the most popular project management strategies: The Lean Approach [2]. The salient characteristic of this approach is its simplicity, as this strategy is about finding the shortest path and removing all barriers to it. [3] state that although this way of thinking is entirely logical and rational, most organizations are incapable of creating a lean organization because they falsely consider Lean to be a complex mixture of methods and tools.

Lean thinking is described as an approach that focuses on customer value, elimination of waste, and optimal utilization of the resources available to the organization [4]. It is a holistic approach to applying lean principles, concepts, and tools. Lean thinking can be applied in every institution regardless of the type, size, or nature of its industrial or service activity. It can work in any aspect of the institution, whether administrative, financial, or technical [5]. According to [6], the application of lean thinking contributes to reducing costs, improving quality, and delivering on time while maximizing revenue, improving company share in the market, and building an institutional structure based on a long-term strategy of future goals and aspirations.

The most important aspect of the solid foundation of every step in Lean thinking is the need for a highly skilled employee who can learn advanced techniques and become a more creative thinker. Therefore, employee participation is one of the critical success factors of Lean Thinking implementation [8], and active participation is required for fulfilling continuous improvement in organizations [9]. In Lean thinking, employees are considered a resource that needs to be developed through training in order to be able to meet the criteria of the five principles of Lean Thinking [10]. Lean Thinking principles require employees to think creatively in order to identify the value of customers and make appropriate improvements in the measures taken to reduce waste in a process workflow. A paradigm shift must occur in employees' minds because this quality practice involves a more systematic way of thinking [3].

Strategic planning is a crucial element in the strategic management of any Industrial Company [11]. However, according to [12], strategic planning is an adaptable set of concepts, operations, instruments, and activities that seek to help people and companies figure out what they should be doing, how, and why.

The efficiency and competitiveness of industrial companies are one of the most prominent challenges facing organizations now, which motivates many organizations to search for strategies and tools that enable them to achieve

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efficiency and encounter competition [13]. Lean thinking is one of the most important strategies that enable organizations to achieve their goals through tools and methodologies designed to help identify waste and search for solutions to reduce or eliminate it as much as possible [3]. The employment of lean thinking in industrial companies plays a fundamental role in discovering strengths and weaknesses in performance and designing accurate plans to improve productivity and increase profits.

The remainder of this paper is structured as follows. The next section reviews the pertinent literature and summarizes lean thinking and strategic planning studies. The study then discusses the method used for collecting and analyzing data. The findings of the study are then presented. The paper will be concluded with a discussion of the results, the study's limitations, and suggested directions for future research.

This study tries to find answers to the following questions:

- 1- What is the degree of implementing lean thinking in industrial companies in Jordan from the upper and middle management perspective?
- 2- What is the degree of strategic planning implementation in Jordan industrial companies from the upper and middle management perspective?
- 3- What is the impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective?

2. Literature Review

2.1 Lean Thinking

Toyota introduced Lean thinking as a method to increase operational effectiveness by decreasing waste in the early 1960s. Queue time, setup time, transportation time, overproduction, and poor planning are a few examples of production waste. The lead time it takes to produce a component, which includes both value-added and non-value-added times, from the delivery of raw materials to the shipping of the product to the customer, is one way to measure waste in operations [6,14].

The main goal of the lean thinking concept is to cut costs by reducing waste, which is accomplished by using strict problem-solving techniques and ongoing improvement initiatives [15]. This strategy must be thoroughly embedded in the organization's culture and align with the management's goals, vision, and workforce development concepts to be effective.

Adopting new improvement methods is impossible without a change in the workforce. [16] emphasize the importance of teamwork carried out by workers. Changing towards lean thinking requires a combination of committed management, proper training, and an environment that enables organizations to sustain improvement.

The key to establishing a culture of lean thinking within a company is establishing ongoing managerial and employee involvement in the project. This requires a change in management mindset because implementing lean approaches promotes long-term improvements made with employee involvement, which could conflict with an organization's short-term financial objectives [10]. This transition may be particularly difficult for hierarchical organizations when worker involvement in decision-making or problem-solving is low. Both management and employees must develop a new perspective for the project to be successful, therefore activities must be planned with the desired shift in mind [7].

2.2 Strategic Planning

Strategic planning is a method that outlines a company's approach to achieving its mission, and it is considered one of the most highly valued tools in management for translating organizational ideas into reality [17]. Research has shown that companies that use strategic planning tend to be more successful and effective than those that do not [18]. According to [19], strategic planning is crucial for an organization to maintain and achieve a competitive advantage over other organizations. In order to achieve competitive advantage, [20] highlight the need for resources that are valuable, rare, and non-substitutable. Successful companies utilize strategic planning to create and communicate their vision and mission, as well as guide organizational decisions regarding resource allocation to enhance competitive positions and address competing priorities [21]. However, [22] assert that a strategic plan without effective and measurable implementation is insufficient.

According to [23], strategic planning involves using a systematic approach to address a situation with the intention of achieving a desired outcome and creating value from latent opportunities. Unlike traditional planning models such as long-range planning, strategic planning is dynamic and system-oriented, emphasizing environmental awareness and interdisciplinary collaboration to address complex issues and strengthen organizational capacity. Traditional approaches to planning tend to be static and inward-looking, addressing strategic issues at the department level and providing

minimal value to organizational development. In contrast, strategic planning gives equal weight to internal and external forces and contingencies, and takes into account the organization's purpose, mission, vision, and the impacts of stakeholder demands and socio-political influences.

Strategic planning is a critical component of strategic management and has become an essential management tool for transforming organizational goals into reality [18]. It involves locating a master plan that defines the organization's activities and resource distribution to achieve its goals [24]. Strategic planning identifies the external and internal environment for the organization, develops an overall vision and mission, allocates resources, and selects strategies to be pursued [25]. It is a formal approach to organizational decision-making that determines long-term goals and directs the organization towards achieving them [26].

Strategic planning aims to align the organization's activities with its objectives [27]. It has two functions: first, it allocates scarce resources according to the competitive environment, and second, it promotes and strengthens the organization's financial capacity [28]. Strategic planning is based on four essential elements: future decision-making, process, philosophy, and structure [20]. Factors that determine the success of strategic planning include procedural, systematic, continuous, leader-driven, and operational components [24].

Study hypotheses

The main hypothesis: There is a statistically significant impact of lean thinking on strategic planning in industrial companies in Jordan at ($\alpha \leq 0.05$)

The Sub hypotheses:

The first sub-hypothesis: There is a statistically significant impact of lean thinking on strategic analysis in industrial companies in Jordan at ($\alpha \leq 0.05$)

The second sub-hypothesis: There is a statistically significant impact of lean thinking on strategic formulation in industrial companies in Jordan at ($\alpha \leq 0.05$)

The third sub-hypothesis: There is a statistically significant impact of lean thinking on strategic implementation in industrial companies in Jordan at ($\alpha \leq 0.05$)

The fourth sub-hypothesis: There is a statistically significant impact of lean thinking on strategic evaluation and control in industrial companies in Jordan at ($\alpha \leq 0.05$)

Study model

Models of the study are presented in Figure 1.

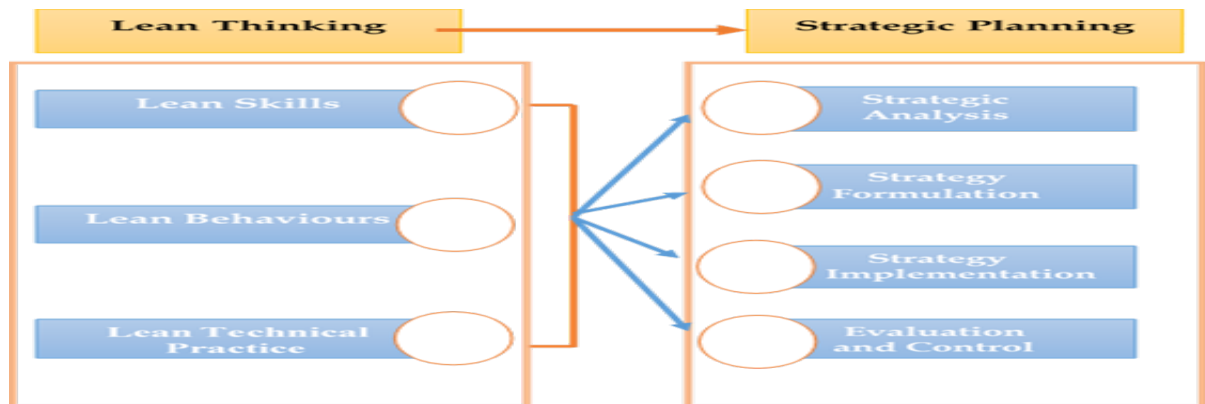


Fig. 1: Model of the Study

3. Research methodology

3.1 The Research Instrument

The instrument contains items for measuring the impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective.

The questionnaire contains (4) demographic variables and (35) questions that represent study variables as follows:

Lean thinking: formulated into benchmarks or objectives to reach, divided into (3) fields with a total of (15) questions:

- **Lean Skills:** consists of (5) questions.
- **Lean Behaviours:** consists of (5) questions.
- **Lean Technical Practices:** consists of (5) questions.

Strategic planning: formulated into benchmarks or objectives to reach, divided into (4) fields with a total of (15) questions:

- **Strategic Analysis:** consists of (5) questions.
- **Strategy Formulation:** consists of (5) questions.
- **Strategy Implementation:** consists of (5) questions.
- **Evaluation and Control:** consists of (5) questions.

3.2 Data Analysis and Interpretation

To examine the hypotheses and the impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective, the Statistical Package for Social Sciences (SPSS) will be used in processing the following statistical techniques and tests in data analysis:

1. **Reliability Test** for the Instruments of Measurement. The reliability of a measure highlights the stability of consistency with which the instrument is measuring the concept and helps to assess the 'goodness' of a measure.
2. **Frequencies and percentages** to describe demographical variables.
3. **Descriptive Statistical Techniques:** these included means and standard deviations. These techniques will be used to illustrate respondents' study fields.
4. **Linear Regression Test** to explore the direct impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective. Respondents were asked to read each item and select one of the following options:
 - Score 5: For the (Strongly Agree Answer)
 - Score 4: For the (Agree Answer)
 - Score 3: For the (Neutral Answer)
 - Score 2: For the (Disagree Answer)
 - Score 1: For the (Strongly Disagree Answer)

Those were divided into three stages (1.33 is the length of each stage):

- High: For means (1-2.33)
- Moderate: For means (2.34-3.67)
- Low: For means (3.68-5)

3.3 Study Sample:

The population of the study was selected randomly and consisted of (320) upper and middle managers, classified into the demographic characteristics indicated in the tables below:

Table 1: Demographic characteristics of the study sample (Gender)

Gender	Sample	
	Frequency	Percentage %
Male	283	88.4
Female	37	11.6
Total	320	100.0%

Table (1) shows that the percentage of males in the sample was (88.4%) and of females (11.6%).

Table 2: Demographic characteristics of the study sample (Years of Experience)

Years of Experience	Sample	
	Frequency	Percentage %
Less than 5 years	41	12.8
5-10 years	65	20.3
11-15 years	48	15.0
More than 15 years	166	51.9
Total	320	100.0%

Table (2) shows the demographics of the years of experience of the study sample, where participants were divided into four categories according to their experience. The first category represents participants with the fewest years of experience (less than five years); this category makes up (12.8%) of the sample. The second category represents experience ranging between 5–10 years and makes up (20.3%) of the study sample. The third category, which represents participants whose experience ranges between 11-15 years, makes up (15.0%) of the study sample. The last category, which represents participants with more than 15 years of experience, makes up (51.9%) of the study sample.

Table 3: Demographic characteristics of the sample (Academic Level)

Academic Level	Sample	
	Frequency	Percentage %
Bachelor's Degree	232	72.4
Diploma Degree	20	6.3
Master's Degree	52	16.3
PhD Degree	16	5.0
Total	320	100.0%

For the variable (Academic Level), it seems that the (Bachelor's Degree) rank achieved (72.4 %) and (Diploma Degree) rank achieved (6.3 %), while (Master's Degree) rank achieved (16.3 %) and (Ph.D. Degree) rank achieved (5.0 %).

Table 4: Demographic characteristics of the sample (Administration Level)

Administration Level	Sample	
	Frequency	Percentage %
Head Department	82	25.6
Department Director	36	11.3
Unit Manager	36	11.3
General Manager	166	51.8
Total	320	100.0%

For the variable (Administration Level), it shows that the (Head Department) achieved (25.6 %), the (Department Director) achieved (11.3%), the (Unit Manager) achieved (11.3%) and the (General Manager) achieved (51.8%).

3.4 Validity of the instruments

The test was sent to experts to judge the validity and reliability of the test. For this reason, it will be designed to meet such requirements of validity for such a test. To explore the impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective, experts will be chosen according to their broad experiences in the field.

3.5 Tool reliability:

To reach the reliability in the test, I will explore the impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective, to check whether students will achieve stability.

Table 5: Cronbach's alpha for study fields

Field Number	Field	Value of (α)
1	Lean Skills	0.778
2	Lean Behaviors	0.803
3	Lean Technical Practices	0.818
Lean Thinking		
1	Strategic Analysis	0.775
2	Strategy Formulation	0.859

3	Strategy Implementation	0.856
4	Evaluation and Control	0.877
Strategic planning		

As shown in the table above, the total Cronbach's alpha for study fields was above (0.60), which will ensure the stability of the study results.

4. Study Results

To analyze the data and to answer the study questions, as well as explore the impact of lean thinking on strategic planning in industrial companies in Jordan from the upper and middle management perspective, tests performed were done as follows:

Questions of the study

Question 1: What is the degree of implementation of lean thinking in industrial companies in Jordan from the upper and middle management perspective?

Means and standard deviations were calculated for each field in the study instrument. Table (6) shows the results as follows:

Table 6: Descriptive statistics for lean thinking in industrial companies in Jordan from the upper and middle management perspective

Field Number	Field	Mean	Std. Deviation	Level
F1-1	Lean Skills	4.25	0.50	High
F1-2	Lean Behaviors	4.24	0.53	High
F1-3	Lean Technical Practices	4.22	0.55	High
Lean Thinking		4.24	0.45	High

As the above table shows, the lean skills field achieved a mean of (4.25) and a standard deviation of (0.50); the lean behaviors field achieved a mean of (1.24) and a standard deviation of (0.53); and lean technical practices field achieved a mean of (4.22) and a standard deviation of (0.55). This means that **lean thinking** variables achieved a total mean of (4.24) and a total standard deviation of (0.45).

- **Learn skills**

Means and standard deviations were calculated for each field in the study instrument. Table (7) shows the results as follows:

Table 7: Descriptive Statistics for lean skills

Question number	Question	Mean	Std. Deviation	Rank
1	The company's administration develops the skills of its employees.	4.30	0.64	2
2	The company's administration prepares employees to enable them to meet the requirements of their expected future assignments.	4.28	0.64	3
3	The company's administration follows job rotation with employees in order to expand the skills base.	4.03	0.62	5
4	The company's administration attracts distinguished individuals with diverse skills to benefit from them in transferring their expertise to others.	4.20	0.85	4
5	The company's administration appreciates people who contribute to the success of others' tasks in different departments	4.43	0.64	1
Lean skills		4.25	0.50	

As the above table shows, the total mean for this field was (4.25), with a standard deviation of (0.50). We also note that statement (5) "The company's administration appreciates people who contribute to the success of others' tasks in different departments," ranked first with a mean of (4.43) and a standard deviation of (0.64), whereas statement (3) "The company's administration follows job rotation with employees in order to expand the skills base, with a mean of (4.03) and a standard deviation of (0.62), achieved the last rank.

- **Lean Behaviors**

Means and standard deviations were calculated for each item in lean behaviors. Table (8) shows the results as follows:

Table 8: Descriptive statistics for lean behaviors

Question number	Question	Mean	Std. Deviation	Rank
6	The company's administration encourages team work.	4.47	0.61	1
7	The company's administration informs the employees of the developments related to the nature of their work.	4.24	0.68	2
8	The company's administration adopts a performance appraisal strategy.	4.15	0.75	5
9	The company's administration deals positively with the suggestions made by the employees.	4.18	0.65	4
10	The company's administration adopts initiatives that increase positive employee behavior.	4.19	0.85	3
	Lean Behaviors	4.24	0.53	

As the above table shows, lean behaviors scored a total mean of (4.24), with a standard deviation of (0.53). Moreover, statement (6) "The company's administration encourages teamwork," ranked first with a mean of (4.47) and a standard deviation of (0.61), whereas statement (8), "The company's administration adopts a performance appraisal strategy", which scored a mean of (4.15) and a standard deviation of (0.75) achieved the last rank.

- **Lean Technical Practices**

Means and standard deviations were calculated for each item in technical practices. Table (9) shows the results as follows:

Table 9: Descriptive statistics for lean technical practices

Question number	Question	Mean	Std. Deviation	Rank
11	The company's administration is interested in analyzing the causes of problems that hinder the completion of work by using emerging technologies.	4.27	0.76	2
12	The company's administration adopts the automation of various processes to complete the business efficiently.	4.20	0.80	4
13	The company's administration designs a flexible IT strategy to keep pace with emerging changes.	4.21	0.66	3
14	The company's administration is interested in designing work procedures by using Artificial intelligence in a way that reduces the waste of time and effort.	4.37	0.75	1
15	The company's administration eliminates the unnecessary services available in the enterprise by providing big data.	4.06	0.67	5
	Lean Technical Practices	4.22	0.55	

As the above table shows, lean technical practices scored a total mean of (4.22) and a standard deviation of (0.55). We also note that statement (14), "The company's administration is interested in designing work procedures by using Artificial intelligence in a way that reduces the waste of time and effort" ranked first with a mean of (4.37) and a standard deviation of (0.75), whereas statement (15) "The company's administration eliminates the unnecessary services available in the enterprise by providing big data", with a mean of (4.06). A standard deviation of (0.67) achieved the last rank.

Question 2: What is the degree of implementation of strategic planning in industrial companies in Jordan from the upper and middle management perspective?

Means and standard deviations were calculated for each field in the study instrument. Table (10) shows the results as follows:

Table 10: Descriptive statistics for strategic planning in industrial companies in Jordan from the upper and middle management perspective

fieldnumber	Field	Mean	Std. Deviation	Level
F2-1	Strategic analysis	4.15	0.52	High
F2-2	Strategy Formulation	4.03	0.58	High
F2-3	Strategy Implementation	4.00	0.60	High
F2-4	Evaluation and Control	4.24	0.58	High

Strategic Planning	4.10	0.49	High
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As the above table shows, strategic analysis achieved a mean of (4.15) and a standard deviation of (0.52); strategy formulation achieved a mean of (4.03), and a standard deviation of (0.58); strategy implementation achieved a mean of (4.00) and a standard deviation of (0.60); and evaluation and control achieved a mean of (4.24) and a standard deviation of (0.58), rendering the total mean of strategic planning (4.10), and standard deviation (0.49).

- **Strategic analysis**

Means and standard deviations were calculated for each item in the strategic analysis. Table (11) shows the results as follows:

Table 11: Descriptive statistics for strategic analysis

Question number	Question	Mean	Std. Deviation	Rank
16	The company's administration makes use of past experience in strategic analysis results	4.18	0.64	3
17	The company's administration analyzes the internal environment to identify sources of strength and weakness	4.11	0.81	4
18	The company's administration studies the available resources strategically.	4.19	0.68	2
19	The company's administration is characterized by flexibility while dealing with variables in the internal and external environment	4.06	0.76	5
20	The company's administration studies the external factors while determining the scope of the company's prospective market.	4.20	0.64	1
	Strategic analysis	4.15	0.52	

As the above table shows, the total mean for this field is (4.15), with a standard deviation of (0.52). We also note that the statement (20), "The company's administration studies the external factors while determining the scope of the company's prospective market" ranked first with a mean of (4.20) and a standard deviation of (0.64), whereas statement (19) "The company's administration is characterized by flexibility while dealing with variables in the internal and external environment", which achieved a mean of (4.06) and a standard deviation of (0.76), achieved the last rank.

- **Strategy Formulation**

Means and standard deviations were calculated for each item in strategy formulation. Table (12) shows the results as follows:

Table 12: Descriptive statistics for strategy formulation

Question number	Question	Mean	Std. Deviation	Rank
21	The company's administration engages staff members in the planning process.	3.86	0.88	5
22	The company's administration uses scientific methods in strategic planning.	4.12	0.68	1
23	There is coordination between the general objectives at the level of the administrative units in the company	3.99	0.70	4
24	The company's administration prepares its mission in a balanced manner, in proportion to the available capabilities and resources.	4.11	0.66	2
25	The company's administration designs strategies that reflect the future potential of the company.	4.09	0.72	3
	Strategy Formulation	4.03	0.58	

As the above table shows, the total mean for this field was (4.03), with a standard deviation of (0.58). We also note that statement (22) "The company's administration uses scientific methods in strategic planning" ranked first with a mean of (4.12) and a standard deviation of (0.68), whereas statement (21), "The company's administration engages staff members in the planning process", which achieved a mean of (3.86). A standard deviation of (0.88) achieved the last rank.

• **Strategy Implementation**

Means and standard deviations were calculated for each item in strategy implementation. Table (13) shows the results as follows:

Table 13: Descriptive statistics for strategy implementation

Question number	Question	Mean	Std. Deviation	Rank
26	The company's administration implements the strategic plans within a specific period of time.	4.04	0.77	2
27	The company's administration follows a systematic approach in implementing strategic plans.	3.99	0.71	3
28	The company's administration uses the process re-engineering method while implementing strategic plans.	3.89	0.80	5
29	The company's administration enforces the implementation of plans through different levels in the company.	4.09	0.62	1
30	The company's administration develops training programs in order to implement the strategic plans properly.	3.98	0.85	4
	Strategy Implementation	4.00	0.60	

As the above table shows, the total mean for this field was (4.00), with a standard deviation of (0.60). We also note that statement (29), "The company's administration enforces the implementation of plans through different levels in the company," ranked first with a mean of (4.09) and a standard deviation of (0.62), whereas statement (28) "The company's administration uses the process re-engineering method while implementing strategic plans", which achieved a mean of (3.89). A standard deviation of (0.80) achieved the last rank.

• **Evaluation and Control**

Means and standard deviations were calculated for each item in Evaluation and Control. Table (13) shows the results as follows:

Table 14: Descriptive statistics for evaluation and control

Question number	Question	Mean	Std. Deviation	Rank
31	The company's administration follows a strict control system that follows specific procedures.	4.31	0.67	2
32	The company's administration uses strict control methods in accordance with published realistic standards.	4.33	0.75	1
33	The company's administration evaluates set plans periodically.	4.13	0.75	5
34	The company's administration establishes a system that provides necessary information to detect deviations.	4.23	0.70	3
35	The company's administration amends plans according to the initial results of the present goals.	4.21	0.70	4
	Evaluation and Control	4.24	0.58	

As the above table shows, the total mean for this field was (4.24), with a standard deviation of (0.70). We also note that statement (32) "The company's administration uses strict control methods following published realistic standards," ranked first with a mean of (4.33) and a standard deviation of (0.75), whereas statement (33) "The company's administration evaluates set plans periodically", which achieved a mean of (4.13). A standard deviation of (0.75) achieved the last rank.

Testing the study hypotheses

In order to test the hypotheses of the study, I used the structural equation model (SEM) through AMOS V23 software. Table. (15) shows the results of these tests:

Table 15: The results of the hypotheses test

Hypotheses	impact direction	B	t-value	Sig	R ²	Adjusted R ²
H01	lean thinking -> strategic planning	0.78	14.941	0.00**	0.412	0.411
H01.1	lean thinking -> strategic analysis	0.73	17.587	0.00**	0.493	0.491
H01.2	lean thinking -> strategic formulation	0.80	13.573	0.00**	0.367	0.365

H01.3	lean thinking -> strategic implementation	0.84	9.741	0.00**	0.230	0.227
H01.4	lean thinking -> strategic evaluation and control	0.89	10.916	0.00**	0.273	0.270

It appears from the results of the following table:

- The value of the direct impact of lean thinking on strategic planning was negated (0.78), and the value of (t) was statistically significant at the level of statistical significance ($\alpha = 0.05$). The percentage of what is explained by the lean thinking in strategic planning was (41.2%), and that this percentage has reached (41.1%) through the value of the index of the Adjusted coefficient of determination. This confirms the acceptance of the main hypothesis of the study.
- The value of the direct impact of lean thinking on strategic analysis was (0.73), and the value of (t) was statistically significant at the level of statistical significance ($\alpha = 0.05$). The percentage of what is explained by the lean thinking in the strategic analysis was (49.3%), and that this percentage has reached (49.1%) through the value of the index of the Adjusted coefficient of determination. This confirms the acceptance of the first sub-hypothesis of the study.
- The value of the direct impact of lean thinking on the strategic formulation was (0.80), and the value of (t) was statistically significant at the level of statistical significance ($\alpha = 0.05$). The percentage of what is explained by the lean thinking in the strategic formulation (36.7%), and that this percentage has reached (36.5%) through the value of the index of the Adjusted coefficient of determination. This confirms the acceptance of the second sub-hypothesis of the study.
- The value of the direct impact of lean thinking on strategic implementation was (0.84), and the value of (t) was statistically significant at the level of statistical significance ($\alpha = 0.05$). The percentage of what is explained by lean thinking in strategic planning was (23.0%), and this percentage reached (22.7%) through the value of the Adjusted determination coefficient index. This confirms the acceptance of the third sub-hypothesis of the study.
- The value of the direct effect of lean thinking on strategic evaluation and control was (0.89), and the value of (t) was statistically significant at the level of statistical significance ($\alpha = 0.05$). The percentage of what is explained by the lean thinking in strategic evaluation and control was (27.3%), and that this percentage reached (27%) through the value of the Adjusted determination coefficient index. This confirms the acceptance of the fourth sub-hypothesis of the study.

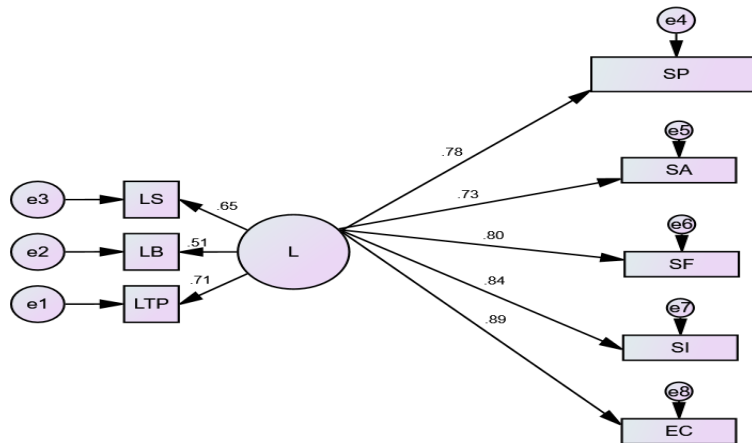


Fig. 2: Model of study hypothesis test

5. Discussion and Conclusion

5.1 Discussion

The literature provides evidence that the relevant dimensions of improving the productivity of industrial firms and increasing their profits differ from case to case. The illustrative dimensions of the industrial companies in Jordan show which companies are reducing waste, improving workers' skills, creating solid organizational behaviors among them, and introducing modern technology at work. The importance of variables associated with reducing waste and using technology (i.e., speed and accuracy) has appeared frequently in the literature, and this is also the case in our research. Similar to the findings by [4], product quality and speed of delivery positively influence the formulation and implementation of plans drawn up by industrial firms.

The results showed that the degree of implementation of lean thinking in industrial companies in Jordan was high from

the upper and middle management perspective. This indicates that the upper and middle management seeks to provide more value to customers by increasing production speed and minimizing waste practices by balancing the process flow, reducing inventory, and reducing lead times. The premise is that lean thinking helps develop a system that can respond flexibly to customer demand without neglecting high efficiency. These results are in line with the majority of previous studies. They support the view that implementing Lean thinking helps improve the quality of services and products companies offer. For example, [29] concluded that lean thinking is positively and statistically linked with reduced waste and increased employee performance. [30] found that using lean thinking is positively and statistically associated with improved organizational performance and plans for a given company.

The results also revealed that the degree of implementation of strategic planning in industrial companies in Jordan was high from the upper and middle management perspective. This indicates that the upper and middle administrations seek to identify all strengths and weaknesses with great accuracy, control their resources and expenditures, and predict the problems that they may face in the near or distant future. They also employ strategic planning to identify and enhance all the expertise, skills and information that the company possesses and then use it to improve the products it offers and achieve the company's desired objectives in the end.

It was concluded that lean thinking plays a major role in facilitating the implementation of tasks, speeding up the completion of work, and reducing waste in companies. Lean thinking involves planning and thoughtful commitment to resources. It is often argued that an intense focus on specific and inflexible plans may lead to rigidity in companies, making it difficult to transition to a different set of resources [31]. However, well-planned firms have overcome the tendency to overemphasize essential resources by generating capabilities to use resources in distinctive ways [32], reconfigure resources, and build new resources in a lean manner. Moreover, in addition to investing resources only in major projects, these companies are experimenting with reshaping the resources and using them in various ways to respond effectively to the changing environment. Adequate resource planning is a competitive advantage, especially for small businesses facing severe resource constraints.

5.2 Conclusion and Further Research

The application of the concept of lean thinking can be widely realized in the manufacturing sector. Lean concepts such as value mapping, value flow, waste disposal, quality design, and the Six Sigma concept make exploring the achievement of strategic planning goals possible for industrial companies in Jordan. The strategic planning goal is to provide resilient infrastructure and sustainable industrial development. The characteristics of the said goal can be achieved by employing the latest emerging technologies, such as artificial intelligence. Industrial companies can formulate their strategies and implement them more broadly by engaging and employing waste-free thinking, accurately controlling the production process, eliminating waste, and maintaining quality to provide infrastructure and produce sustainable infrastructure.

In the manufacturing process, it is imperative that manufacturers consider using more modular designs and minimizing redundant processes and waste treatment. Consideration must also be given to shortening the delivery time to respond quickly to customer needs. Training employees to think lean, improve product quality, and increase delivery speed takes more product sales to customers. The organization is viewed as a complete system of management planning.

The contribution of this study is to demonstrate the role that the lean thinking interaction plays in enhancing the results of strategic planning. Our findings reveal a positive impact of lean thinking, especially regarding lean technology practices, on improving strategic planning and innovation. This finding has several implications. First, achievement-oriented lean thinking and waste reduction serve as a central guiding mechanism for improving departmental decisions [33]. [34] point out that flexibility, perseverance, and thinking differently contribute to overcoming difficulties in production when things get tough in a changing environment. Second, companies cannot rigorously develop and implement a strategic plan. Instead, enterprises need to constantly monitor the environment in which they operate, reconsider their strategic plans to enhance their environmental responsibility, and find adequate alternatives to reduce waste and speed up production.

To ensure the success of lean thinking, the organization's employees must have the appropriate skills and knowledge. Most workers in the organization fail to understand the benefits of lean thinking and how to apply it correctly. Thus, failure to recognize value-added and non-value-added activities will result in wasted production workflow; additional cost and time will be required if employees cannot understand the basic concepts of lean thinking.

Based on the results of the study, several things are taken into consideration for further research. These considerations include the following: a) the flexible thinking approach is applied continuously so that its application is in the long term. For this reason, repairs must be carried out continuously in industrial enterprises; B) Paying more attention to processes that do not add value more precisely so that they can be minimized and produce efficient and effective processes. Optimizing processes that add value to the product so that it increases productivity; C) It is expected that

future studies will consider applying other methods along with lean thinking to be able to improve strategic planning that was not written in this study.

Conflicts of Interest Statement

Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this paper.

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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