



مركز الاستشارات والبحوث والتطوير  
بأكاديمية السادات للعلوم الإدارية

# مجلة البحوث الإدارية

## Journal of Management Research

علمية - متخصصة - فُحكمة - دورية ربع سنوية

للسنة  
الثانية والأربعون

Vol. 42, No.1; Jan. 2024

عدد يناير 2024



[www.sams.edu.eg/crdc](http://www.sams.edu.eg/crdc)

رئيس مجلس الإدارة  
أ.د. محمد حسن عبد العظيم  
رئيس أكاديمية السادات للعلوم الإدارية

رئيس التحرير  
أ.د. أنور محمود النقيب  
مدير مركز الاستشارات والبحوث والتطوير

ISSN : 1110-225X

**The role of implementing lean six sigma approach as a strategic  
HRM role for creating a competitive advantage**

**SUBMITTED By**

**Rania Abd El.Aziz Zidan**

Doctoral researcher in human resource management department  
Sadat Academy for Management Sciences

## **Abstract**

Lean Production and Six Sigma are the most popular and widely used strategies by companies that seek continuous improvement, and creating competitive advantage. The pharmaceutical sector is one of the most important sectors to maintain the quality and efficiency of all its operations, but according to the current study, Egyptian pharmaceutical companies must try to distinguish themselves by deployment of LSS as a strategic resource for problem solving. This research aims to develop a Lean six sigma Framework to create a competitive advantage.

To achieve that aim, a research strategy consisted of literature review and questionnaire is designed to gather data sufficiently rich to cover the research topics and investigate the perception and application of pharmaceutical companies towards implementing lean six sigma as a strategic HRM role as an approach for creating competitive advantage. Although only SEDICO was surveyed as a case study, other companies that share similar characteristics will benefit from the application of the framework towards creating competitive advantage.

**Key Words:** Competitive Advantage, Lean Six Sigma.

## Introduction

Competitive advantage is regarded as the ability of the organization to differentiate itself from other competitors. Furthermore, competitive advantage is also an essential foundation for devising business strategies to attain sustainable growth.

Most of Business professionals admitted that lean six sigma is a contemporary quality excellence methodology for achieving the set goals in addition to achieving competitive advantages for the organization.

Although Lean Six Sigma is best known as a project-based improvement structure, but Lean Six Sigma is much broader than that. Lean Six Sigma is an established philosophy, an organizational and improvement structure as well as a set of tools. Using this perspective Lean Six Sigma addresses organizational issues with respect to competitiveness, cost reduction, and customer satisfaction.<sup>(1)</sup>

To deliver excellent results in organizational performance, lean six sigma can be used as a strategic resource for problem solving, being more innovative in sourcing, recruiting, on-boarding talented employees in an attempt to create a competitive advantage.

Jarad, G. A. (2020)<sup>(2)</sup> .illustrated that in order to transform a short-run competitive advantage into a sustained competitive advantage exists only when other firms are incapable of duplicating the benefits of a competitive advantage. Therefore, four criteria must be attributable to the resource in order for it to provide a sustained competitive advantage:

- 1) The resource must add positive value to the firm,
- 2) The resource must be unique or rare among current and potential competitors,
- 3) The resource must be poorly imitable,
- 4) The resource cannot be substituted with another resource by competing firms.

---

1- Alfaro, C. R., Madrigal, G. B., & Hernández, M. C. (2020). Improving forensic processes performance: A Lean Six Sigma approach. *Forensic Science International: Synergy*, 2, 90-94.,.

2- Jarad, G. A. (2020). The Role of Knowledge Management in Creating Competitive Advantage in Small and Medium-Size Enterprises in the Republic of Iraq. *THEORY METHODOLOGY PRACTICE: CLUB OF ECONOMICS IN MISKOLC*, 16(2), 17-26..

---

Depending on your ambition and need, Lean Six Sigma can be implemented in phases.

### **Literature reviews about lean six sigma:**

In pharmaceutical companies, Lean Six Sigma is a continuous improvement approach that focuses on improving customer satisfaction, speed, quality, and reducing process variation and defects.

Generally, the literature reviews about lean six sigma were to improve measures such as safety, efficiency, quality and customer satisfaction, to identify and eliminate waste, to define critical success factors for lean six sigma implementation, and to support staff to examine every process happened in their department.

Hence (Purwanto, Agus, et al.2020)<sup>(1)</sup>, (Winatie, Adha, et al,2020)<sup>(2)</sup>, (Sneha Chavva, B. 2020)<sup>(3)</sup> discussed various tools for lean six sigma in pharmaceutical case studies such as; fishbone diagram, FEMA, pareto diagram. These studies depended on just in time and linking LSS to business strategy for more successful implementation.

The study of (Raja Sreedharan, V., et al, 2020)<sup>(4)</sup> focused on reviewing the impact of Lean Six Sigma (LSS) on HR practices from the literature arena. The study has reviewed 68 research articles. From the review, key findings concerning that LSS and HR go along very well and can be used as a strategy for creating competitive advantage. Implementing lean six sigma in human resource enhances its practices through depending on top management commitment, effective training, organizational culture, linking LSS to business strategy and finally just in time.

---

1-Purwanto, A., Wirawati, S. M., Arthawati, S. N., Radyawanto, A. S., Rusdianto, B., Haris, M., ... & Yunanto11, D. A. (2020). Lean Six Sigma Model for Pharmacy Manufacturing: Yesterday, Today and Tomorrow. *Systematic Reviews in Pharmacy*, 11(8), 304-313.

2-Winatie, A., Saroso, D. S., Purba, H. H., & Wirani, A. P. (2020, July). Reducing of Defects in the Drug Tablets Production Process with DMAIC to Improve Quality–Study Case of Pharmaceutical Industry. In *IOP Conference Series: Materials Science and Engineering* (Vol. 852, No. 1, p. 012126). IOP Publishing

3-Sneha Chavva, B. (2020). *A Comparative Study on Lean and Six-Sigma Implementation at Various Pharmaceutical Industries in India and Ireland* (Doctoral dissertation, Griffith College).

4-Raja Sreedharan, V., Balagopalan, A., Murale, V., & Arunprasad, P. (2020). Synergizing Lean Six Sigma with human resource practices: evidence from literature arena. *Total Quality Management & Business Excellence*, 31(5-6), 636-653..

Additionally, the study of (Lin Grensing-Pophal, 2020)<sup>(1)</sup> which depended on communication skills, effective training as the most important dimensions for lean six sigma implementation. The study was about how to implement Lean and Six Sigma in Talent Acquisition, the author tried to adopt of Lean Six Sigma methodology and tools to improve operational efficiency in all areas of the organization, including in HR.

The company reduced its recruiting cycle time by 56 percent by improving the company's social media presence, simplifying the job application and better defining Lawson's sales representative position. This was accomplished through a wide range of process improvements, including the use of technology to streamline some processes.

### **Literature reviews about competitive advantage;**

Literature proved that, Competitive advantage was found to be dependent variable or mediator.

Some studies concerned with human resource management practices and competitive advantage -as a significant dependent variable-which are; (Kerdpitak, C., et al,2020)<sup>(2)</sup> showed that practices of HRM such as employees training (ET), learning practices (LP) and employee selection (ES) increase the competitive advantage (CA) in the pharmacy companies of Thailand. The employee training increases the capability of human capital that improve the competitive advantage of the business. In addition, learning practices increase the learning of the employee of new technology in the market that also enhance the competitive advantage of the company. Moreover, effective and fair employee selection practices hire the trained and loyal employee that also increase the competitive advantage of the business.

(Subrahmanyam, S., et al, 2020)<sup>(3)</sup> Was completely agree with the above literature, but added that; Employee retention has a positive and significant role in gaining a competitive advantage for Carrefour supermarket in Erbil

---

1-Lin Grensing-Pophal.(2020), Lean and Six Sigma in Talent Acquisition. International journal for lean six sigma,7, 430-466.,

2- Kerdpitak, C., & Jernsittiparsert, K. (2020). The Impact of Human Resource Management Practices on Competitive Advantage: Mediating Role of Employee Engagement in Thailand. *Systematic Reviews in Pharmacy*, 11(1), 443-452.

3- Subrahmanyam, S., & Arif, S. A. F. (2020). Human Resources Practices as a Strategic Tool for Competitive Advantage. *Solid State Technology*, 63(5), 1004-1019.



A study by (Hung Duc Pham, 2019 <sup>(1)</sup>) examined the impact of human resource management practices on enterprises' competitive advantages and business performance. He found; the quality of human resources, human resource behavior, human resource management practices have a positive effect on the competitive advantage of human resources at Vietnam Post and Telecommunications Group enterprises.

(Arsawan, I. W. E., et al 2020 <sup>(2)</sup>) suggested that; The ability to apply knowledge management was the most relevant in gaining a sustainable competitive advantage, These innovations should be in line with organizational change management because innovation is a source of creativity and practical solutions in maintaining competitive advantage. Competitive advantages were associated with knowledge and innovation culture, especially in developing countries.

On the other hand; Competitive advantage was found to be a significant mediator. A study by Mukhsin,et.al (2022)<sup>(3)</sup> sought to examine the effect of sustainable supply chain management on company performance mediated by competitive advantage, This type of research is quantitative research with descriptive research and causal research using questionnaires distributed directly to the JBG Pottery actors as many as 100 respondents. The results of the study found that sustainable supply chain management affects competitive advantage, company performance was also observed to be influenced by sustainable supply chain management and competitive advantage while company performance was also found to be affected by sustainable supply chain management through the mediating effect of competitive advantage.

### **Research problem Identification**

In this study, the researcher focuses on depending on LSS as a system for improving the ways to create a competitive advantage.

The problem could be defined as follow:

---

1- Pham, H. (2019). Impact of human resource management practices on enterprises' competitive advantages and business performance: Evidence from telecommunication industry. *Management ..Science Letters* , 10(4), 721-732

2- Arsawan, I. W. E., Koval, V., Rajjani, I., Rustiarini, N. W., Supartha, W. G., & Suryantini, N. P. S. (2020). Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage. *International Journal of Productivity and Performance Management*.

3- Mukhsin, M., & Suryanto, T. (2022). The effect of sustainable supply chain management on company performance mediated by competitive advantage. *Sustainability*, 14(2), 818.

---

" Is there an influence relationship for lean six sigma approach as a strategic HRM role to create a competitive advantage in the Egyptian pharmaceutical companies, especially SEDICO Pharmaceuticals?"

### **Research Importance**

#### For the academic perspective

-Highlighting the importance of lean six sigma methodology in emphasizing the ability to deliver high quality at a low cost which is central to the organizational success and survival.

-Presenting the role of implementing lean six sigma approach in creating a competitive advantages.

#### For the Empirical perspective

Lean six sigma approach has several benefits for the pharmaceutical companies which are enabling mutual development, maintaining accomplished results and changes, allowing to be a pioneer or in the first position in the market place.

### **Research Objectives**

1-To examine the responsibility of implementing lean six sigma approach as a strategic HRM role in attaining the competitive advantage.

2- To create a conceptual framework model that defines the relationship between implementing lean six sigma approach as a strategic HRM role, creating competitive advantage.

### **Researcher Hypotheses**

- There is significant relation between the five components of lean six sigma as a strategic HRM Role and cost.
- There is significant relation between the five components of lean six sigma as a strategic HRM Role and quality.
- There is significant relation between the five components of lean six sigma as a strategic HRM Role and flexibility.



## Research operational framework

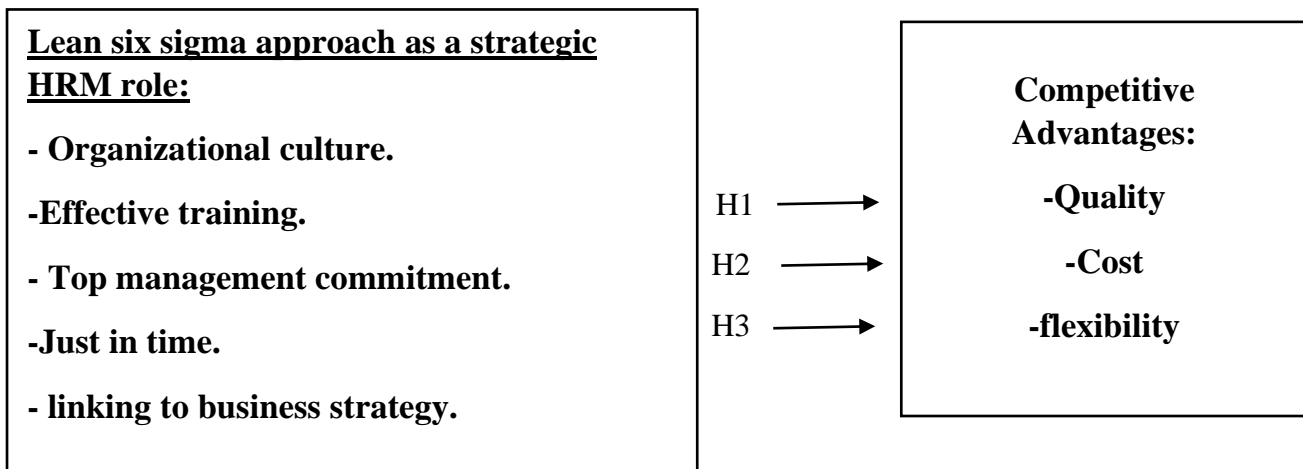


Figure (1) operational framework, designed by the researcher

## Research Boundaries

### Time

- ❖ October 2022 to December 2022 for the pilot study.
- ❖ 2020 to 2023 for the main study.

### Place

The Egyptian pharmaceutical companies especially on SEDICO Pharmaceutical Company as a case study.

### Research Population

Accordingly, the study will be applied on a sample of employees on SEDICO Pharmaceutical Company.

### Research sampling unite

Simple random sample consists of 384 employees in senior and middle management at SEDICO Pharmaceutical Company, to produce reprehensive sample.

### Research Methodology, tools, Plan

#### Research Methodology

This study is conducted through exploratory, descriptive and analytical methodologies as follows;

### **Exploratory Methodology:**

- ❖ Quantitative analysis was under taken such as questionnaire for exploring the three key components.

### **Descriptive Methodology:**

- ❖ For describing the theoretical base for the study in the theoretical study.

### **Analytical Methodology:**

- ❖ The study covered both methodologies which are quantitative and qualitative research methods.
- ❖ The qualitative involves three questionnaires distributed to the employees within SEDICO Pharmaceutical Company that the researcher applies the study on them.

### **Research tools**

- Interviews; The researcher conducted interviews with 50 employees from the senior and middle management.
- Questionnaires;

To ensure the validity and reliability of the study, the measurement items are adapted from exiting scales in the literature that have been developed and used from previous studies. All constructs were measured using multiple items and all items are measured via five-point Likert-type scales, ranging from “5” (highly satisfied) to “1” (highly dissatisfied).

Table (1) lean six sigma scale:

<b>Dimensions</b>	<b>N. Measurements</b>	<b>Reference</b>
<b>Organizational culture.</b>	5	J. Singh, H. Singh,2019 Noor Hazilah et.al,2018 Raja sredharan,et.al2020
<b>Effective Training.</b>	6	Costa,et.al,2020 Swaranker,et.al,2020 sarman,et.al,2022
<b>Top management commitment.</b>	6	Olga maria,et al2021 sarman,et al2022
<b>Just in Time.</b>	8	Swaranker,et.al,2020 Costa,et.al,2020 Lizarelli,et.al,2020
<b>Linking to business strategy.</b>	5	Jiju Antony,et al 2022 Sarman,et.al2022

Source: Designed By the researcher

Table (2) Competitive advantage scale:

Dimensions	N. Measurements	Reference
Quality.	5	Gupta,et.al2020 Arsawan L.W.E.et.al,2020
Cost.	6	Abker et al. , 2019 Mutuku,et.al,2019 Mukhsin,et.al, 2022
Flexibility.	5	Abker et al. 2019 Mutuku,et.al,2019 Mukhsin,et.al, 2022

Source: Designed By the researcher

## Research Plan

The research divided into;

- 1- Research definitions.
- 2- Research dimensions.
- 3- Research model.
- 4- Statistical analysis.

### 1.1-LSS definitions;

The improved quality of processes and products is one of the most important modern business strategies. Development and implementation of an effective quality excellence strategy has become a crucial factor for the long-term success of organizations. Thus, the ability to deliver high quality at a low cost is central to an organization's success and survival.

Based on the above figure; Lean Six Sigma (LSS)<sup>(1)</sup> is a contemporary quality excellence methodology that allows firms to accomplish this objective through a combination of Lean and Six Sigma. Lean focuses on rapid process improvements (by elimination of waste and improving flow) and Six Sigma focuses on robust quality improvements (by reducing process variation and defects).

---

1- Juliani, F., & de Oliveira, O. J. (2020). Linking practices to results: an analysis toward Lean Six Sigma deployment in the public sector. *International Journal of Lean Six Sigma*.

(Vallejo, V, et al )<sup>(1)</sup> revealed that LSS is a methodology to improve operations and increase their advantage over competitors. The application of LSS can bring benefits to companies in terms of competitive advantage; lead time increases of up to 80%, quality and operation cost reductions by 20% and improvements to delivery times of up to 99%.

### 1.2- CO.AD definitions;

Competitive advantage (CA) has defined as the extent in which an organization can create a defensible position over its competitors (Agung, N. F. A., & Darma, G. S. (2019))<sup>(2)</sup> and includes an attributes that allows an organization to distinguish itself from its competitors (Chen, C. J. (2019))<sup>(3)</sup>.

CA is related to the unique resources and competencies. Where other competitors do not have, which leads to better performance over the competitors<sup>(4)</sup>. CA is based on the competitive capabilities and the past literature suggests price/cost, quality, delivery and flexibility as important. The recent literature identifies time is also an important source of competitive advantage. According to Cao, G., Duan, Y., & Cadden, T. (2019)<sup>(5)</sup>. Competitive advantage is the best effort for adding value to customer; based on the following capabilities; competitive pricing, premium pricing, value to customer, quality, dependable delivery and product innovation. Competitive advantage has defined as an attributes for adding value to make differences in performance<sup>(1)</sup>.

---

1- Vallejo, V. F., Antony, J., Douglas, J. A., Alexander, P., & Sony, M. (2020). Development of a roadmap for Lean Six Sigma implementation and sustainability in a Scottish packing company. *The TQM Journal*.

2- Agung, N. F. A., & Darma, G. S. (2019). Opportunities and Challenges of Instagram Algorithm in Improving Competitive Advantage. *International Journal of Innovative Science and Research Technology*, 4(1), 743-747..

3- Chen, C. J. (2019). Developing a model for supply chain agility and innovativeness to enhance firms' competitive advantage. *Management Decision*..

4- Kumar, A., & Kumar(2021), G. TALENT MANAGEMENT: A Source OF SUSTAINABLE COMPETITIVE ADVANTAGE..

5- Cao, G., Duan, Y., & Cadden, T. (2019). The link between information processing capability and competitive advantage mediated through decision-making effectiveness. *International Journal of Information Management*, 44, 121-131..

1- Hughes, Claretha(2022). "Applying Diversity-Intelligent Organizational Strategies for Competitive Advantage." In *Research Anthology on Changing Dynamics of Diversity and Safety in the Workforce*, pp. 796-824. IGI Global.

## 2.1- LSS dimensions;

2.1.1- Organizational culture: Culture is the general customs, characteristics, beliefs, and knowledge of a particular group of people. While organizational culture is a system of shared values, assumptions and beliefs of the people behave in organizations. This can be defined as how employees understand each other's viewpoints well enough to agree with them as genuine and make changes in the organization<sup>(2)</sup>.

### 2.1.2- Effective Training

Effective LSS training program would provide the platform to groom LSS experts and LSS project leaders, equipped with comprehensive LSS knowledge<sup>(3)</sup>. It is critical to provide the opportunity for employees to improve their skill and knowledge and connects the employees into the LSS world through training. Identify the need of training and development of training content are the two fundamental steps to ensure an effective training program.

### 2.1.3- Top management commitment (TMC)

Top management involvement and provision of appropriate resources and training is an important strategy in implementing a success LSS methodology<sup>(4)</sup>.

Top management commitment, support and guidance is essential for any quality implementation project to champion their employees' required skill and training development.

---

2- Antony, J., Lizarelli, F. L., & Fernandes, M. M. (2020). A global study into the reasons for Lean Six Sigma project failures: Key findings and directions for further research. *IEEE Transactions on Engineering Management*, 69(5), 2399-2414.

3- Madhani, P. M. (2022). Lean Six Sigma deployment in retail industry: enhancing competitive advantages. *Available at SSRN...*

4- Sreedharan V, R., Sunder M, V., Madhavan, V., & Gurumurthy, A. (2020). Development of lean six sigma training module: evidence from an emerging economy. *International Journal of Quality & Reliability Management*, 37(5), 689-710.

#### 2.1.4- Linking to business strategy

Sarman, et al (2022<sup>(1)</sup>) identified a weak link between LSS projects and strategic objectives of any business as part of top four critical failure factors. As suggested by Nursasongko, et al, the integration of lean and Six Sigma or sequential implementation alongside other competitive advantage measures must be part of cultural and strategic decision making of managers in any organisation.

#### 2.1.5- Just in time

Just in time is a form of operations management method that dates back to the 1950s in Japan. It was implemented by Toyota and other Japanese manufacturing businesses, with great success: Toyota and other companies that followed the technique saw large increases in productivity<sup>(2)</sup>.

---

1- Sarman, S., & Soediantono, D. (2022). Literature Review of Lean Six Sigma (LSS) Implementation and Recommendations for Implementation in the Defense Industries. *Journal of Industrial Engineering & Management Research*, 3(2), 24-34.

2- Nursasongko, H., Niman, N., & Biardhian, L. E. (2022). Sosialisasi Penggunaan Lean Six Sigma dengan Konsep DMAIC untuk Menghilangkan Muda Proses Pengambilan Baut Lebih dari Standar. *Jurnal Ilmiah Wahana Pendidikan*, 8(11), 443-454.



## 2.2- CO.AD dimensions:

Based on the study of; Gupta, G. 2022<sup>(1)</sup>, Arsawan L.W.E.et,al2020<sup>(2)</sup>, mutuku et al2019<sup>(3)</sup>, wanjiru et al,2019<sup>(4)</sup>, Mukhsin,et.al.2022<sup>(5)</sup>;

2.2.1.Quality; is a way to differentiate a product or service so that it is delivered without flaws or shortcomings, and this is accomplished by adhering firmly to the criteria that are assessed and certified, making them reachable and achievable, and all of this is measured based on their satisfaction? The ISO standard defines quality as a group of characteristics and attributes of a product or service provided to customers or users and is able to openly or consistently satisfy their needs.

2.2.2. Cost: In an economic sense, it is the total of what a company spends in terms of the value of materials, labor, and indirect expenses to make a certain item. In other words, it is the cost of materials, labor, and other expenses spent by a company or company in the production of products and services.

Dimensions of price and cost:

- Manufacturing cost.
- Value added.
- Selling price.
- Running cost - cost of keeping the product running.
- Service cost - cost of servicing the product.
- Profit.

---

1- Gupta, G. (2022). Does 'big data' provide a competitive advantage to firms: an antitrust analysis. *Asian Journal of Business Ethics*, 11(2), 423-442.

2- Arsawan, I. W. E., Koval, V., Rajiani, I., Rustiarini, N. W., Supartha, W. G., & Suryantini, N. P. S. (2020). Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage. *International Journal of Productivity and Performance Management*.

3- Mutuku, M. K., Muathe, S., & James, R. (2019). Mediating effect of competitive advantage on the relationship between e-commerce capability and performance: Empirical evidence from commercial banks in Kenya. *European Journal of Business and Management*, 11(17), 48-57. <https://doi.org/10.7176/EJBM/11-17-06>

4- Nursasongko, H., Niman, N., & Biardhian, L. E. (2022). Sosialisasi Penggunaan Lean Six Sigma dengan Konsep DMAIC untuk Menghilangkan Muda Proses Pengambilan Baut Lebih dari Standar. *Jurnal Ilmiah Wahana Pendidikan*, 8(11), 443-454.

5- Wanjiru, A. I., Muathe, S. M., & Kinyua-Njuguna, J. W. (2019). The mediating effect of competitive advantage on the relationship between corporate strategies and performance of manufacturing firms in Nairobi City County, Kenya. *Journal of Business and Management (IOSR-JBM)*, 21(4), 7-15. <https://doi.org/10.5430/jms.v10n4p21>

2.2.3.Flexibility: After manufacturing became based on client demand, flexibility has become one of the most important competitive advantages today. In both technology and business operations, flexibility is a desirable trait. Shorter product cycle times, worldwide competitiveness, ongoing pressures to decrease and control costs, and the need to respond to shareholder expectations all drive the hunt for flexibility. Companies often either deploy new 'flexible' technologies or seek to adapt current technology in order to react to the demand for flexibility.

It can be concluded that the different types of flexibility defined within such classifications and addressed in the literature include:

- Product flexibility: the ability to add or substitute easily new parts.
- Volume flexibility: the ability of a manufacturing system to vary total production volume economically .
- Mix flexibility: the ability of a firm to produce different combinations of products economically and effectively .
- Machine flexibility: the ability of a machine to perform different types of operation without requiring a prohibitive effort in switching from one to another .
- Labor flexibility: the ability of the workforce to perform a broad range of manufacturing tasks economically and effectively .
- Market flexibility: the ability to adapt to a changing market environment easily.
- Process flexibility: the ability of a manufacturing system to process a given set of components with different processes, operations sequence and materials .
- New product flexibility: the ability of a manufacturing system to introduce and manufacture new parts and products .
- Expansion flexibility: the ability to increase capacity and capability easily when needed

3- Research model.

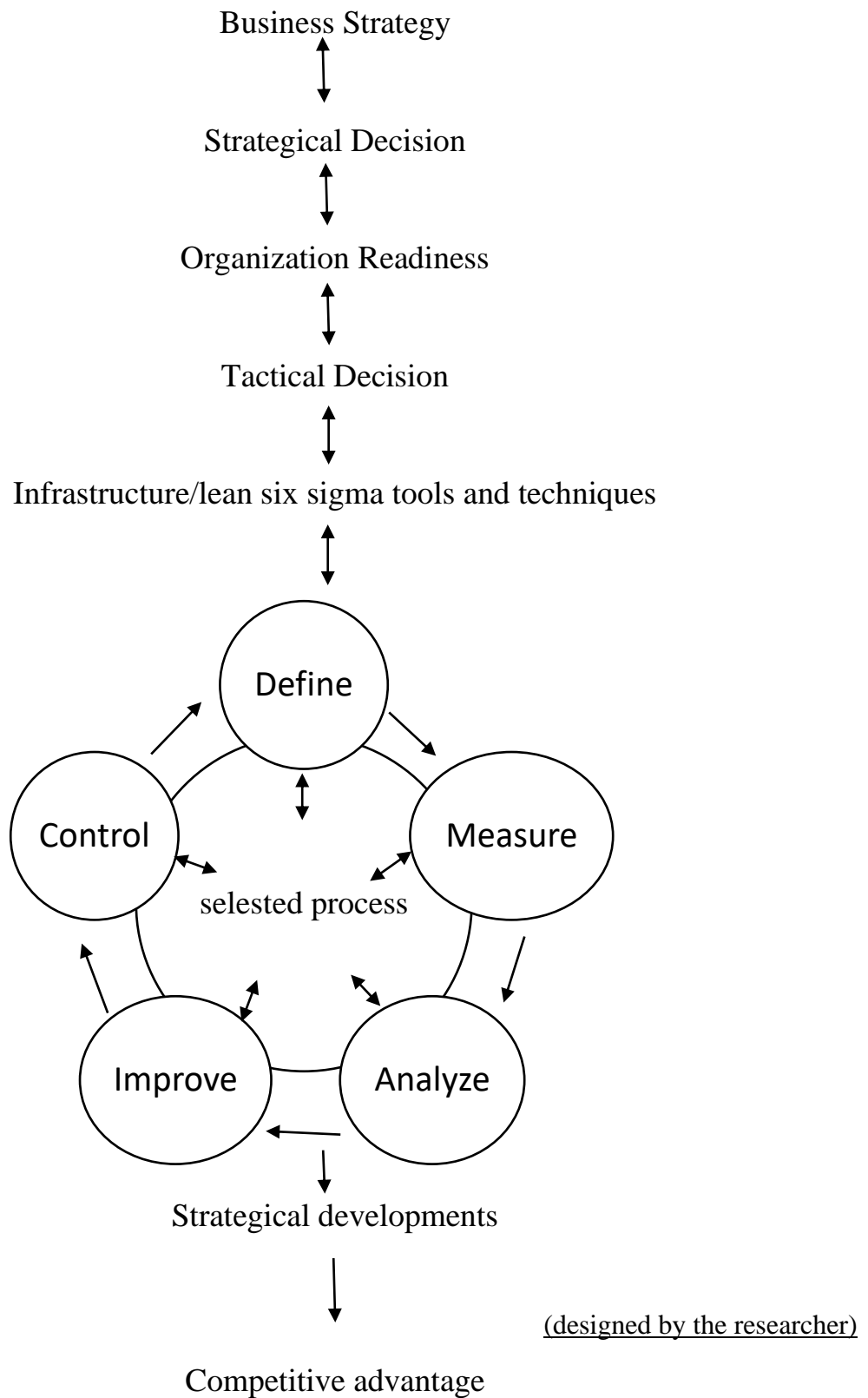


Figure (2) LSS approach for creating a competitive advantage.

4- Statistical Analysis:

4.1 Respondents' Demographics

Table 4.1: Demographic characteristics

<i>Variable</i>	<i>Category</i>	<i>Count</i>	<i>%</i>
<b>Gender</b>	Female	63	46.0%
	Male	74	54.0%
<b>Age</b>	Less than 30 years old	30	21.9%
	From 30 - 40 years old	59	43.1%
	From 40 - 50 years	30	21.9%
	more than 50 years	18	13.1%
<b>Marital Status</b>	Married	97	70.8%
	Single	40	29.2%
<b>Qualification</b>	Bachelor	77	56.2%
	Diploma	5	3.6%
	Master	28	20.4%
	PhD	27	19.7%
<b>years of experience</b>	Less than 5 years	33	24.1%
	from 5 to 10 years	38	27.7%
	From 10 to 20 years	42	30.7%
	more than 20 years	24	17.5%
<b>Job position</b>	Assistant manager	41	29.9%
	Head section	29	21.2%
	Manager	36	26.3%
	Supervisor	31	22.6%

The demographic characteristics of respondents were reported in table 4.1 associated with some graphs that can be found in appendix B. Between the respondents, there about 54% of the sample were males, and 46% were females. 22% of the respondents aged less than 30 years' old, 43% aged from 30 - 40 years' old, 22% aged from 40 - 50 years, and 13% aged more than 50 years. Among the respondents, 71% were married and 29% were single. 56% of them had bachelor degree, 4% had diploma, 20% had master's degree, and 20% had

PhD. The results also show that 24% had experience less than 5 years, 28% had experience from 5 to 10 years, 31% had experience from 10 to 20 years and 18% had experience had experience more than 20 years. 30% of the respondents were Assistant managers, 26% were managers, 23% were supervisors, and 21% were head section.

#### 4.2 Relative Importance Index

Relative Importance Index (RII) is used to determine the relative importance of quality factors involved. According to Chen et al. (2010), the importance levels from the relative importance index are derived as in table 4.3. The results of relative importance index are reported in table 4.4 along with the corresponding ranking and their importance level.

Table 4.2: Importance Levels

Importance Levels	Abbreviation	Range
High	H	$0.8 < RII < 1.0$
High-Medium	H-M	$0.6 < RII < 0.8$
Medium	M	$0.4 < RII < 0.6$
Medium-Low	M-L	$0.2 < RII < 0.4$
Low	L	$0.0 < RII < 0.2$

From the ranking table that fifty-nine items were identified as “High” importance levels which are considered of prime importance for the selection of its constructs. These “High” importance indicators have RII in the range of 0.861–0.800. The results also show that eleven items were identified as “High-Medium” importance levels which are considered of second importance for the selection of its constructs. These “High-Medium” importance indicators have RII in the range of 0.799–0.737.

Table 4.3: Ranking criteria for the selection of items

<i>Variable</i>	<i>Dimension</i>	<i>Item</i>	<i>Mean</i>	<i>RII</i>	<i>Ranking within the Dimension</i>	<i>Ranking within the Variable</i>	<i>Overall ranking</i>	<i>Importance level</i>
<b>Lean Six Sigma</b>	<b>Organizational Culture</b>	OC1	4.26	0.853	2	2	2	H
		OC2	4.25	0.850	3	3	3	H
		OC3	4.21	0.842	4	6	7	H
		OC4	4.31	0.861	1	1	1	H
		OC5	3.69	0.737	5	30	70	H-M
	<b>Effective Training</b>	ET1	4.22	0.844	1	5	5	H
		ET2	4.15	0.831	2	9	17	H
		ET3	4.01	0.801	3	25	56	H
		ET4	3.90	0.780	5	28	67	H-M
		ET5	3.88	0.775	6	29	68	H-M
		ET6	3.98	0.796	4	26	63	H-M
	<b>Top Management Commitment</b>	TMC1	4.16	0.832	1	8	16	H
		TMC2	4.04	0.807	6	23	46	H
		TMC3	4.07	0.813	4	21	39	H
		TMC4	4.12	0.825	2	13	25	H
		TMC5	4.04	0.809	5	22	43	H
		TMC6	4.09	0.819	3	19	33	H
	<b>Just in Time</b>	JIT1	4.11	0.822	6	16	28	H
		JIT2	4.07	0.815	7	20	38	H
		JIT3	4.12	0.823	4	14	26	H
		JIT4	3.92	0.784	8	27	66	H-M
		JIT5	4.12	0.823	5	15	27	H
		JIT6	4.17	0.834	1	7	12	H
		JIT7	4.13	0.826	2	10	21	H
		JIT8	4.12	0.825	3	12	23	H
	<b>Linking to Business Strategy</b>	LBS1	4.22	0.844	1	4	4	H
		LBS2	4.09	0.819	4	18	31	H
		LBS3	4.03	0.806	5	24	48	H
		LBS4	4.10	0.820	3	17	29	H
		LBS5	4.13	0.826	2	10	21	H
<b>Quality</b>	QUAL1	4.20	0.839	1	1	8	H	



		QUAL2	4.18	0.835	2	3	10	H
		QUAL3	4.17	0.834	3	4	11	H
		QUAL4	4.15	0.829	5	7	18	H
		QUAL5	4.16	0.832	4	6	15	H
	<b>Cost</b>	COST1	4.07	0.815	3	11	37	H
		COST2	4.09	0.819	2	9	33	H
		COST3	4.18	0.836	1	2	9	H
		COST4	3.84	0.768	6	16	69	H-M
		COST5	3.99	0.797	5	15	62	H-M
		COST6	4.02	0.804	4	14	50	H
	<b>Flexibility</b>	FLEX1	4.16	0.832	1	5	14	H
		FLEX2	4.07	0.815	3	10	36	H
		FLEX3	4.09	0.819	2	8	30	H
		FLEX4	4.03	0.806	5	13	47	H
		FLEX5	4.04	0.809	4	12	44	H

#### 4.4 Internal Consistency Reliability

Table 4.4: Reliability of measurement model analysis

<i>Construct</i>	<i>Cronbach's Alpha</i>	<i>rho_A</i>	<i>Composite Reliability</i>	<i>Remark</i>
Competitive Advantages	0.968	0.968	0.971	Reliability attained
Cost	0.916	0.916	0.934	
Culture	0.841	0.854	0.889	
Effective Training	0.916	0.916	0.935	
Flexibility	0.921	0.922	0.941	
Just in time	0.929	0.93	0.942	
LSS	0.974	0.976	0.976	
Linking to business strategy	0.922	0.924	0.942	
Quality	0.942	0.943	0.956	
Top management Commitment	0.908	0.91	0.929	

Despite its popularity, Cronbach's alpha is criticized for assuming that all of the indicators have equal outer loadings, and that the number of indicators influences the calculation of Cronbach's alpha in that fewer items produces lower value, especially in scales with items fewer than 10 (Pallant, 2010, Hair et al., 2017). Due to the limitations of Cronbach's alpha, researchers are advised to use other measures of internal consistency such as composite reliability (CR), and rho (Jöreskog, 1971). Jöreskog rho measure is a better reliability measure than Cronbach's alpha in SEM, since it is based on the loadings rather than the correlations observed between the observed variables (Demo et al., 2012). CR measures the internal consistency while considering that each indicator has a different outer loading. Following the previous rules, the reliability of each construct was assessed using the calculations provided in SmartPLS. The results in Table 4.4 show that all constructs had a reliability (Cronbach's Alpha, rho, and Composite Reliability) score of more than 0.70.

#### 4.5 Convergent Validity

Table 4.5: Convergent validity (AVE)

<b>Construct</b>	<b>Average Variance Extracted (AVE)</b>	<b>Remark</b>
Competitive Advantages	0.676	Accepted
Cost	0.704	
Culture	0.618	
Effective Training	0.705	
Flexibility	0.761	
Just in time	0.668	
LSS	0.576	
Linking to business strategy	0.764	
Quality	0.813	
Top management Commitment	0.686	

The AVE is a common measure used to establish convergent validity which represents the grand mean of the squared loadings of the indicators measuring a construct. The AVE of a construct should be 0.50 or higher to be considered

significant. Following the previous guidelines, the convergent validity through AVE was established as shown in table 4.5.

#### 4.6 Descriptive statistics

Table 4.6: Descriptive Statistic for the Selected Variables

Construct	Mean	SD	CV
Organizational Culture	4.143	0.698	16.84%
Effective Training	4.022	0.836	20.79%
Top Management Commitment	4.088	0.733	17.93%
Just in Time	4.095	0.754	18.41%
Linking to Business Strategy	4.115	0.750	18.22%
Quality	4.169	0.797	19.12%
Cost	4.033	0.785	19.47%
Flexibility	4.080	0.812	19.90%
<b>Lean Six Sigma</b>	<b>4.093</b>	<b>0.685</b>	<b>16.75%</b>
<b>Competitive Advantages</b>	<b>4.094</b>	<b>0.754</b>	<b>18.42%</b>

These include; mean (M), standard deviation (SD), and coefficient of variation (CV) were calculated and reported in table 4.6. The descriptive statistics for the independent variable “*Lean Six Sigma*” were ( $M = 4.093, SD = 0.685, CV = 16.75\%$ ), and for the dependent variable “*Competitive Advantages*” were ( $M = 4.094, SD = 0.754, CV = 18.42\%$ ). Between the dimensions of *Lean Six Sigma*, it was found that *Organizational Culture* has the highest average ( $M = 4.143$ ), and the minimal variability ( $SD = 0.698, CV = 16.84\%$ ). Finally, among the dimensions of *Competitive Advantages*, it was found that *Quality* has the highest average ( $M = 4.169$ ), and minimal variability ( $SD = 0.797, CV = 19.12\%$ ).

#### 4.7 Coefficient of Determination

Table 4.7: R Square and Associated R Square Adjusted

Construct	R Square	R Square Adjusted	Remark
Competitive Advantages	0.807	0.804	High

Cost	0.679	0.675	High
Flexibility	0.741	0.737	High
Quality	0.720	0.716	High

Coefficient of determination ( $R^2$ ) refers to the effect of independent variables on the dependent latent variables (Hair, Sarstedt, Ringle, & Mena, 2012), which is one of the quality measures of the structural model (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014).  $R^2$  estimates vary from 0 to 1, in which 0 means low explained variance and 1 means high explained variance. Researchers have used a different cut-off of  $R^2$  value. For example, in business research, Chin (1998) suggested that  $R^2$  with 0.19, 0.33, or 0.67 are low, moderate, or high, respectively.

The results of R Square are reported in table 4.7. The R-Square value of Competitive Advantages equals  $R^2 = 0.807$  meaning that about 81% of the variations in Competitive Advantages were explained by the variation in LSS.

#### 4.8 Effect size

Table 4.8:  $f^2$  Effect Size

<b>Main Hypotheses</b>	
<b>Path</b>	<b><i>f-square</i></b>
LSS -> Competitive Advantages	3.918
<b>Sub-Hypotheses</b>	
<b>Path</b>	<b><i>f-square</i></b>
LSS-> Cost	0.238
LSS-> Flexibility	0.16
LSS-> Quality	0.088

Table 4.8 presents the  $f^2$  effect size of the constructs. The results illustrate that all effect sizes were significant indicating great importance to the model, and were distributed as follows: LSS have large effect on competitive advantage with  $f^2 = 3.918$ . The results also showed that LSS has greatest effect on Cost  $f^2 = 0.238$ , Flexibility  $f^2 = 0.16$ , and Quality  $f^2 = 0.088$ .

#### 4.9 Goodness of Fit of the Model

Tenenhaus et al. (2005), proposed the Goodness of Fit (GoF) as a global fit indicator; it is the geometric mean of both the average  $R^2$  the average variance extracted of the endogenous variables. The aim of GoF's is to take into consideration the research model at all stages, i.e. the measurement model and the structural model, with an emphasis on the overall model performance (Henseler & Sarstedt, 2013). The GoF index for the main hypothesis can be calculated as follow:

$$GOF = \sqrt{((R^2) \times (AVE))} = \sqrt{(0.74 \times 0.72)} = 0.73.$$

The criteria of GoF for deciding whether GoF values are not acceptable, small, moderate, or high to be regarded as a globally appropriate PLS model have been given. According to these criteria, and the value of (GoF=0.73), it can be safely concluded that the GoF model has a higher level of fit to considered as sufficient valid global PLS model.

#### **Research findings**

In short, Lean assists organizations in focusing on what is truly critical to their success. Six Sigma methods supplement Lean methods by reducing errors and deviations that result in waste and rework. Adoption of Lean and Six Sigma can have a far-reaching impact on the entire organization, allowing it to gain a competitive advantage.

The current study determined the significance of Lean Six Sigma as a strategic HRM role in the competitive advantage as a whole, as well as the dimensions of the competitive advantage separately ( cost, flexibility, quality).

The study examined the relationship between lean Six Sigma and the competitive advantage, and it discovered a significant positive relationship.

The following is a discussion of the hypothesis analysis results.

- Lean six sigma has a greater effect on Quality, followed by flexibility, finally; cost.
- There is a direct significant effect between lean six sigma approach as a strategic HRM Role (The five components of lean six sigma) and competitive advantage as a whole.

## Recommendations

### 1- LSS action plan

Goals	Sub-goals	Responsibilities Who will do it? Who will participate?	Action steps	Objectives
Implementing lean six sigma approach as a strategic HRM role.	<ul style="list-style-type: none"> <li>-organizational culture.</li> <li>-effective training.</li> <li>-Top management commitment.</li> <li>-just in time.</li> <li>-linking to business strategy.</li> </ul>	<p>The implementation of these goals is the responsibility of the senior management.</p> <p>All department in the organization should participate in it.</p> <p>*Lean Six Sigma can benefit every department with a focus on measuring performance indicators, not just outcomes.</p>	<ul style="list-style-type: none"> <li>-Encourage managers to closely monitor work time.</li> <li>-Encourage communication of successes and sharing best practices.</li> <li>- Provide resources to acquire training in lss improvement strategies.</li> <li>-Provide adequate technical training to have a high skill level compared to the competitors.</li> <li>-Support and actively participates in the activities of the lss projects (training, project selection, review and evaluation of results).</li> </ul>	<p><u>The time period over which the results of implementing LSS can be seen, ranges from one year up to three years.</u></p> <ul style="list-style-type: none"> <li>-Enhance company culture.</li> <li>-Gain hands-on experience in quality management, communication, and project management.</li> <li>-Improve business processes, maintaining quality enhancements and Reducing Project Lifecycle Time.</li> <li>-Eliminate errors, Saving Costs and support the organization.</li> <li>-Improved Employee Performance.</li> <li>-The employees learn how to perform better at their job, as well as how to set and surpass goals.</li> </ul>



## 2- CO.AD action plan

Goals	Sub-goals	Responsibilities Who will do it? Who will participate?	Action steps	Objectives
Creating a competitive advantage.	-cost. -Quality. -Flexibility.	The implementation of these goals is the responsibility of the senior management.  All department in the organization should participate in it.	- Senior management realizes that satisfying the desires and needs of customers is done by providing the product at a low price. - focus on research and development to reduce costs. - Reduce labor cost. - following the competency and previous experience standard in hiring employees to reduce training costs later. -conducting periodic internal inspections to ensure the quality of operations. - Embraces quality and low defect rates in its mission.	- Contribute to higher profit margins.  - Attract more customers more frequently.  - Maintain brand loyalty.  - Add predictability and constancy to the company's revenue streams.  - Attract more brand alliances, talent and potential investors.

## References:

- 1-Agung, N. F. A., & Darma, G. S. (2019). Opportunities and Challenges of Instagram Algorithm in Improving Competitive Advantage. *International Journal of Innovative Science and Research Technology*, 4(1), 743-747..
- 2-Alfaro, C. R., Madrigal, G. B., & Hernández, M. C. (2020). Improving forensic processes performance: A Lean Six Sigma approach. *Forensic Science International: Synergy*, 2, 90-94.,.
- 3-Antony, J., Lizarelli, F. L., & Fernandes, M. M. (2020). A global study into the reasons for Lean Six Sigma project failures: Key findings and directions for further research. *IEEE Transactions on Engineering Management*, 69(5), 2399-2414.
- 4-Arsawan, I. W. E., Koval, V., Rajiani, I., Rustiarini, N. W., Supartha, W. G., & Suryantini, N. P. S. (2020). Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage. *International Journal of Productivity and Performance Management*.
- 5-Cao, G., Duan, Y., & Cadden, T. (2019). The link between information processing capability and competitive advantage mediated through decision-making effectiveness. *International Journal of Information Management*, 44, 121-131..
- 6-Chen, C. J. (2019). Developing a model for supply chain agility and innovativeness to enhance firms' competitive advantage. *Management Decision*..
- 7-Gupta, G. (2022). Does 'big data' provide a competitive advantage to firms: an antitrust analysis. *Asian Journal of Business Ethics*, 11(2), 423-442.
- 8-Hughes, Claretha(2022). "Applying Diversity-Intelligent Organizational Strategies for Competitive Advantage." In *Research Anthology on Changing Dynamics of Diversity and Safety in the Workforce*, pp. 796-824. IGI Global.
- 9-Jarad, G. A. (2020). The Role of Knowledge Management in Creating Competitive Advantage in Small and Medium-Size Enterprises in the Republic of Iraq. *THEORY METHODOLOGY PRACTICE: CLUB OF ECONOMICS IN MISKOLC*, 16(2), 17-26..
- 10-Juliani, F., & de Oliveira, O. J. (2020). Linking practices to results: an analysis toward Lean Six Sigma deployment in the public sector. *International Journal of Lean Six Sigma*.**
- 11-Kerdpitak, C., & Jernsittiparsert, K. (2020). The Impact of Human Resource Management Practices on Competitive Advantage: Mediating Role of Employee Engagement in Thailand. *Systematic Reviews in Pharmacy*, 11(1), 443-452.
- 12-Kumar, A., & Kumar(2021), G. TALENT MANAGEMENT: A Source OF SUSTAINABLE COMPETITIVE ADVANTAGE..
- 13-Lin Gensing-Pophal.(2020), Lean and Six Sigma in Talent Acquisition. *International journal for lean six sigma*,7, 430-466.,.
- 14-Madhani, P. M. (2022). Lean Six Sigma deployment in retail industry: enhancing competitive advantages. *Available at SSRN*..
- 15-Mukhsin, M., & Suryanto, T. (2022). The effect of sustainable supply chain management on company performance mediated by competitive advantage. *Sustainability*, 14(2), 818.

- 16-Mutuku, M. K., Muathe, S., & James, R. (2019). Mediating effect of competitive advantage on the relationship between e-commerce capability and performance: Empirical evidence from commercial banks in Kenya. *European Journal of Business and Management*, 11(17), 48-57. <https://doi.org/10.7176/EJBM/11-17-06>
- 17-Nursasongko, H., Niman, N., & Biardhian, L. E. (2022). Sosialisasi Penggunaan Lean Six Sigma dengan Konsep DMAIC untuk Menghilangkan Muda Proses Pengambilan Baut Lebih dari Standar. *Jurnal Ilmiah Wahana Pendidikan*, 8(11), 443-454.
- 18-Pham, H. (2019). Impact of human resource management practices on enterprises' competitive advantages and business performance: Evidence from telecommunication industry. *Management Science Letters*, 10(4), 721-732
- 19-Purwanto, A., Wirawati, S. M., Arthawati, S. N., Radyawanto, A. S., Rusdianto, B., Haris, M., ... & Yunanto, D. A. (2020). Lean Six Sigma Model for Pharmacy Manufacturing: Yesterday, Today and Tomorrow. *Systematic Reviews in Pharmacy*, 11(8), 304-313.
- 20-Raja Sreedharan, V., Balagopalan, A., Murale, V., & Arunprasad, P. (2020). Synergizing Lean Six Sigma with human resource practices: evidence from literature arena. *Total Quality Management & Business Excellence*, 31(5-6), 636-653.
- 21-Sarman, S., & Soediantono, D. (2022). Literature Review of Lean Six Sigma (LSS) Implementation and Recommendations for Implementation in the Defense Industries. *Journal of Industrial Engineering & Management Research*, 3(2), 24-34.
- 22-Sneha Chavva, B. (2020). *A Comparative Study on Lean and Six-Sigma Implementation at Various Pharmaceutical Industries in India and Ireland* (Doctoral dissertation, Griffith College).
- 23-Sreedharan V, R., Sunder M, V., Madhavan, V., & Gurumurthy, A. (2020). Development of lean six sigma training module: evidence from an emerging economy. *International Journal of Quality & Reliability Management*, 37(5), 689-710.
- 24-Subrahmanyam, S., & Arif, S. A. F. (2020). Human Resources Practices as a Strategic Tool for Competitive Advantage. *Solid State Technology*, 63(5), 1004-1019.
- 25-Vallejo, V. F., Antony, J., Douglas, J. A., Alexander, P., & Sony, M. (2020). Development of a roadmap for Lean Six Sigma implementation and sustainability in a Scottish packing company. *The TQM Journal*.
- 26-Wanjiru, A. I., Muathe, S. M., & Kinyua-Njuguna, J. W. (2019). The mediating effect of competitive advantage on the relationship between corporate strategies and performance of manufacturing firms in Nairobi City County, Kenya. *Journal of Business and Management (IOSR-JBM)*, 21(4), 7-15. <https://doi.org/10.5430/jms.v10n4p21>
- 27-Winatie, A., Saroso, D. S., Purba, H. H., & Wirani, A. P. (2020, July). Reducing of Defects in the Drug Tablets Production Process with DMAIC to Improve Quality—Study Case of Pharmaceutical Industry. In *IOP Conference Series: Materials Science and Engineering* (Vol. 852, No. 1, p. 012126). IOP Publishing