



# INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES



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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v12-i6/12272>

DOI:10.6007/IJARBSS/v12-i6/12272

**Received:** 17 April 2022, **Revised:** 20 May 2022, **Accepted:** 30 May 2022

**Published Online:** 11 June 2022

**In-Text Citation:** (Al Adresi et al., 2022)

**To Cite this Article:** Al Adresi, A., Panigrahi, S. K., Al Shamsi, I., Al Mandhari, I. S., & Bino, E. (2022). Effect of Lean and Agile Supply Chain Practices on the Organizational Performance of Manufacturing Companies in Oman. *International Journal of Academic Research in Business and Social Sciences*. 12(6), 1401 – 1411.

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Vol. 12, No. 6, 2022, Pg. 1401 – 1411

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[www.hrmars.com](http://www.hrmars.com)

ISSN: 2222-6990

## Effect of Lean and Agile Supply Chain Practices on the Organizational Performance of Manufacturing Companies in Oman

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### Abstract

The main purpose of this study is to investigate the effect of lean and agile supply chain practices on the performance of the manufacturing companies in Oman. In recent years, research on supply chain sustainability is still scarce. as a competitive priority, where companies are struggling with how to balance the effectiveness of the supply chain and the pressures of strengthening the supply chain. The study used quantitative data collected through survey of 130 respondents from the manufacturing companies in Oman. The analysis revealed that lean management play an important role in improving organizational performance as compared to the agile management. We further asserted that lean and agile firms need to underpin with different strategies to gain competitive advantage within the industry. There is great importance in the presence of agile and lean Management in companies, which helps supply chains to perform their work in a flexible and rapid manner.

**Keywords:** Lean Management, Agile Management, Supply Chain Management, Performance, Oman

### Introduction

A successful logistics supply chain has flexibility, light mobility and idealism, characterized by sustainability and durability for long periods (Panigrahi et al., 2018). In recent years, research on supply chain sustainability is still scarce. as a competitive priority, where companies are struggling with how to balance the effectiveness of the supply chain and the pressures of strengthening the supply chain. So, companies must understand the best way to implement and design a system that meets the needs of companies such as social requirements and environmental requirements for the stakeholders of the company. The capacity of organizations and their performance is greatly affected by the presence of their information technology. When the organization has good information technology, this helps to enhance its performance and thus it has high flexibility and agility in its supply chain.

It is important for the company to be flexible (meaning that it is efficient and free of waste) and also to be agile (meaning to be fast, light and flexible to meet the needs of the market) (Ciccullo et al., 2018).

It is necessary for companies in Oman to have a fast supply chain in order to produce according to the different and varied requirements of customers and so that the company is able to respond to all customer requirements in a flexible and fast manner. Some companies have a traditional strategy that does not focus on the principles of lean, agile. These companies perform poorly compared to companies that have a strategy focused on focused on lean and agile supply chain practices.

The importance of the research revolves around the definition of the supply chain and the impact of the supply chain management strategy such as the agile and flexible supply chain. The research objectives were also defined in this study to investigate and know the impact of the supply chain management strategy on the performance of the supply chain. The current study has the following research questions:

RQ1: What is the influence of lean management on the performance of the manufacturing companies?

RQ2: What is the influence of agile management on the performance of the manufacturing companies?

The remainder of the paper is as follows. Review of literature on lean management, agile management and organizational performance is presented in the second section. The third section discusses the research design, followed by the data analysis in the section four. The section five highlights the study contribution and managerial implications. The last section underlined the limitation and scope for future research.

### **Literature Review**

The supply chain has emerged as one of the main areas of supply chain research, so the main purpose of the study is to examine and know the role of the lean and agile supply chain in enhancing the external supply chain, as the current study is concerned with the impact of the agile and lean supply chain on the performance of the supply chain (Haseeb et al., 2019).

### **Lean Management**

Lean manufacturing (LM) "Lean", in a manufacturing environment describes the philosophy that integrates a set of tools and techniques into business processes to improve time, human resources, assets, and productivity while improving the quality of products and services for their client (Becker, 1998). It is known that the agile offer is concerned with the quick response to customer requirements and knowing what they want, and it also indicates their ability to produce innovative and new products and the demand is usually unstable. But lean achieves low-cost delivery and eliminates waste (Stratton & Warburton, 2003). The presence of lean management or lean map in companies is important in order to facilitate the process of effective performance of a company and in order to enhance appropriate decision-making (Al Adresi & Darun, 2017).

Lean manufacturing and lean thinking have become essential in the performance of companies as they are able to eliminate waste in the interest of their ability to improve business. So that in order for the storage to be of low level, the waste must be disposed off. When there is an excellent and highly efficient information systems department in the organizations, there will be an ability to manage quality, manage production and products, and manage all suppliers in an organized and efficient manner (Kashani & Baharmast, 2017). Various theories have been presented, as some of them have been criticized due to the presence of several different flaws. Quality management and lean management are two different management approaches to improvement. Quality management focuses on

controlling various business processes such as continuous customer monitoring, and activities such as improvement, supply control and others (Anvari et al., 2011). The essence of Lean Management is the process of revitalizing the company thanks to the changes in its policy, especially in its management patterns and assets (Dekier, 2012). Over the past years, many studies have been shown about the obstacles and problems that companies face when implementing lean management, as the studies are based on conducting various surveys through interviews and others, and many different industrial sectors have been targeted (AlManei et al., 2018). Also, research in the field of agile and flexible software development reflected strong growth, due to the use of agile methodologies. Research made a contribution to the use of agile methodologies, as most of the research lacked the rigor to make an impact in research and practice, in addition to that the rapid research was not expanded to fully include various opportunities and challenges (Tripp et al., 2018). When Lean management is present, this affects the company's performance in a positive way and increases the efficiency and effectiveness of the company's operational processes. In order to achieve a high level of performance, Lean thinking must exist in companies (Fullerton, Kennedy, & Widener, 2014).

Therefore, the following hypothesis is proposed:

H1: Lean management have a positive impact on organizational performance.

### **Agile Management**

Agile management is the application of the principles of agile software development to various management processes, particularly in the project management. In the past years, global project management teams have faced dynamic challenges and continue to grow exponentially with the increasing number of complexities associated with the tasks to be performed. Constantly evolving organizational challenges require project managers to adapt new management practices to achieve organizational goals instead of following traditional management practices.

The ability of agile management practices to reduce the complexity associated with the project and enhance the performance opportunities associated with completion projects in a dynamic environment. Rotter et al (2019) indicated in their study that the ability of agile management practices to manage through complex settings more effectively and efficiently. Maylor and Turner highlighted the aspect of stakeholder engagement in the development process that justifies alleviating project complexity to a greater extent, given that agile management encourages internal project stakeholders to request continuous feedback from each other as well as from clients throughout the process. Doing so reduces the amount of ambiguity from the development stage as much as possible and brings the desired changes along the length of the process (Darun et al., 2020).

Agile management is well equipped to assist managers and software development teams in managing risk, scope, budgets and schedules to create successful and valuable products (Karlesky & Voord, 2008). Agile management positively and directly affected performance as well as positively influenced the operating policy dimensions of quality, delivery and flexibility. The results also indicate that agile manufacturing has a direct positive relationship with the operational performance of the firm and financial performance (Inman et al., 2011). agile management also works to enhance the overall performance of projects and thus ensure the sustainability of organizations in the industry (Muhammad et al., 2021).

Therefore, the following hypothesis is proposed:

H2: Agile management have a positive impact on organizational performance.

### **Research Methodology**

In total there are 4250 companies identified as the population operating their businesses in Oman. Out of which approximately 600 companies were involved in the manufacturing facilities. This study targeted the manufacturing companies for three months by contacting via emails and telephone. In total 130 completed surveys that can be used for the analysis were revealed with the response rate of 21.6%. Using the T-test the data found no response bias and there was no significant difference found in the data collected. The unit of analysis is a manufacturing companies and we used convenience sampling to select the targeted manufacturing companies.

A survey questionnaire was prepared to collect the data. The items included in the survey were adapted from the existing literature. The survey was first prepared in English language and then translated into Arabic. Respondents were asked to indicate their agreement or disagreement with the statements provided using 5-point Likert scale where 1 indicated strongly disagree and 5 indicated strongly agree. Items related to OP require respondents to evaluate their performance as compared to their competitors in the same industry during the last three years.

### **Results**

The descriptive analysis revealed that the majority of the respondents (48.46 per cent) participated were of the age between 31 to 40 years, 27.69% were in the range of between 41 to 50 years, 12.31 from 21 to 30 years and 11.54 from the age of above 50 years. About the managerial working experience of the respondents, the majority of the respondents had been working in the same company for above 1 to 5 years (29.23%), 6 to 10 years (16.15 per cent), whereas 35.38 percent for less than 1 years, respectively (see Table 1).

Table.1

*Demographic profile*

<b>Demographic profile</b>	<b>Total Sample (n = 130)</b>	<b>% of total</b>
<b>Age (Years)</b>		
21 to 30	16	12.31
31 to 40	63	48.46
41 to 50	36	27.69
Above 50	15	11.54
<b>Gender</b>		
Male	59	45.38
Female	71	54.62
<b>Managerial Experience</b>		
Less than 1 year	38	29.23
1 to 5 years	46	35.38
6 to 10 years	34	26.15
More than 10 years	12	9.23
<b>Managerial position</b>		
Top management	40	30.77
Middle Level Manager	55	42.31
Lower level manager	35	26.92
<b>Are you aware of agile management?</b>		
Yes	68	52.31
No	62	47.69
<b>Are you aware of lean management?</b>		
Yes	96	73.85
No	34	26.15

**Reliability Analysis**

Initially principal component analysis was performed to check the number of factors that need to be concerned for explaining the constructs. According to (Adresi & Darun, 2017; Kim & Mueller, 1978), there is a need to check the eigen value of the factors in order to determine the variance. Eigen value greater than 1 confirms the validity of the constructs to be used for the further analysis. Similarly, we performed internal consistency test using Cronbach alpha. The results reported in Table 2 indicated the score was above the threshold value of 0.70, confirming the internal consistency and reliability.

Table 2

*Reliability analysis*

Variables	Number of items	Cronbach alpha Values
Organizational performance	13	0.966
Agile management	11	0.970
Lean management	10	0.965

Now in order to investigate the relationship between agile management and lean management, we conducted a pearson correlation analysis in SPSS (see. Table 3). All the relationships demonstrated a positive and significant correlation with each other at the significant level of 0.001. The findings supported the notion that there is a strong relationship between agile and lean management with organizational performance.

Table 3

*Correlations of the responses*

		M_AGM	M_LM	M_OP
M_AGM	Pearson Correlation	1	.807**	.764**
	Sig. (2-tailed)		<.001	<.001
	N	60	60	60
M_LM	Pearson Correlation	.807**	1	.906**
	Sig. (2-tailed)	<.001		<.001
	N	60	60	60
M_OP	Pearson Correlation	.764**	.906**	1
	Sig. (2-tailed)	<.001	<.001	
	N	60	60	60
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 4

*Hypothesis testing*

Hypothesis	Relationships	Values	Remarks
H1	There is a strong influence of agile management on organizational performance	0.995 (0.324)	Rejected
H2	There is a strong influence of lean management on organizational performance	8.849 (0.001)	Accepted

The first hypothesis is the influence of agile management on organizational performance and the result of this hypothesis is found to be rejected as it has the significant values at 0.324 (more than 0.05) and t value to be 0.995 (less than 1.96). The second hypothesis is the influence of lean management on organizational performance and the result of this hypothesis is found to be accepted as it has the significant values at 0.001 (less than 0.05) and t value to be 8.849 (more than 1.96). The exchange of high-quality information between partners improves the coordination and responsiveness of the partnership and ultimately organizational performance.

## Conclusion

From the findings of the study, we came to the conclusion that companies in Oman need flexible information systems to be able to manage the market in the required manner and achieve a high level of Lean and Agile Management in companies. The presence of a high level of Lean and Agile Management in companies helps to achieve high performance and flexibility in the completion of supply chain operations and also helps to obtain appropriate informational responses to customers and the market as well. The presence of Lean and Agile Management in companies will help to manage the internal processes, which will lead to facilitating the process of producing new designs of products, and the quality of the product will be high as well, and the presence of smart and modern tools that help in producing products in a modern and attractive way and also increases the skills of employees in the company and the company's ability to Produce different quantities of products. Therefore, there is great importance in the presence of Agile and Lean Management in companies, which helps supply chains to perform their work in a flexible and rapid manner.

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**Appendix: Survey questionnaire Items**

<b>Code</b>	<b>Agile management in supply chain</b>
AGM1	Companies always strive to train their employees properly in order to provide agility management for the company
AGM2	Companies are introducing new, diverse and innovative products more than their competitors in order to achieve high agility
AGM3	Organizations that use agile management can be distinguished by performance, manufacturing speed, and rating.
AGM4	I think the agile performance framework for manufacturing companies is more effective than distribution companies.
AGM5	Factory businesses' shared goals include agile production, creativity, and technical collaboration.
AGM6	Flexibility focuses on leading to market reaction while agility focuses on removing non-value-added operations.
AGM7	I believe that agile supply chain distribution enhances the organizational performance of a company
AGM8	New product agility by introducing new products more quickly than our competitors
AGM9	We achieve a competitive advantage by introducing new products more quickly than our competitors and this will increase the agility in our company
AGM10	In Oman the companies always assess managers' ability to perform agile performance
AGM11	Companies in Oman have the agility of products by finding and inserting products faster than competitors
	<b>Lean management in supply chain</b>
LM1	Companies seek to provide logistics services in the fastest way in order to obtain an lean and flexible management
LM2	Key capacities utilize Lean Production standards and apparatuses to decipher CEO orders and give viable, arrangement situated instruments to representatives to help accomplish broadened business objectives.
LM3	Evaluate changes towards lean production of products in manufacturing locations.
LM4	Lean management affects the profitability of companies positively.
LM5	We don't pay much attention to our competitors and don't care about lean management in Oman
LM6	Lean management should be present in all companies in order to facilitate logistics operations in Oman.
LM7	The Management seeks to improve the skills and knowledge of its staff.
LM8	It is important to develop flexibility of thinking to deal with the changes and challenges that occur in the company

LM9	When we have a lean management we can easily satisfy customers with early product delivery
LM10	The Organization monitors and follows the implementation of solutions easily when they have lean management
	<b>Organizational performance</b>
OP1	Difficulties of rapid manufacturing, switching and deploying accurately and at high speed by promoting several times to improve the competitive strength of product manufacturers and business smoothness.
OP2	In order to improve performance in companies, companies provide close workshops in order to facilitate work on machines and processes
OP3	Companies in Oman are placing operations close to each other in order to reduce material storage and reduce material handling, which leads to higher company performance
OP4	The presence of distinguished suppliers in companies is one of the most important factors for the success of companies and the development of their performance
OP5	Companies in Oman are distinguished by the presence of distributors who have high access to different regions.
OP6	We can easily add a wide variety of products in the company without increasing the cost
OP7	Our company can add a variety of products without sacrificing quality and performance.
OP8	Compared with our industry, we introduce new products more slowly in Oman
OP9	We are never the first in our industry to introduce a new product
OP10	Our company can match quality to product specifications and on-time delivery performance to improve our performance
OP11	It seems we are always behind schedule and performance in the companies in Oman.
OP12	We can develop the efficiency of employees and thus enhance the organizational performance of the company
OP13	The performance distribution of the flexible supply chain enhances the organizational performance of the company