

# Continuous Improvement Practices in Manufacturing Companies in the Sultanate of Oman

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## Abstract

**Purpose:** The aims of this study were to identify Continuous Improvement (CI) practices prevailing in the manufacturing companies with regards to Visual Management, Employee Engagement, Leadership, and Risk Management; to identify continuous improvement tools that have been adopted by the manufacturing companies, and to analyze the critical success factors for implementing CI practices in manufacturing companies.

**Design/methodology/approach:** For this study, a survey questionnaire was used to collect the CI practices information from manufacturing companies in Oman. 146 samples were collected from 75 manufacturing units selected at random from the Public Establishment for Industrial Estate database. The data was analyzed for reliability, robustness, ranking tests using Statistical Package for Social Statistics (SPSS).

**Findings:** The majority of the manufacturing firms were using only the CI program for the past five years. However, there were not substantial cost savings for these businesses. The overall sales increased, while the average processing time had declined and the product recalls also had increased.

**Research implications:** The most important factors identified for the effective implementation of CI in industrial firms were effective communication, top management encouragement, and employee involvement, and a conducive organizational atmosphere.

**Practical implications:** Sultanate of Oman like any other GCC countries is undergoing a critical phase in the economy because of the oil price plunge combined with the ongoing COVID-19 pandemic. The paper will be of use to academics, researchers, and continuous improvement practitioners.

**Originality / Value:** So far, very few studies have been conducted in analyzing the factors correlated to CI in the Omani context and no study was carried out before in exploring the CI application in the Sultanate of Oman.

**Keywords:** Continuous Improvement Practices, Critical Success Factors, Visual Management, Employee Engagement, Leadership, Risk Management, Manufacturing Companies/Industries in Oman.

## Introduction

Continuous Improvement (CI) is a quality management concept that was introduced in Japan and has spread all over the world. CI is one of the pillars of production processes focusing on total quality management (TQM), lean method of production, and other classic manufacturing models. A collection of activities that make up a process aimed at improving efficiency is known as Continuous Improvement. These practices primarily involve the reduction/elimination of unwanted wastage, during production. Lower maintenance expenses, the long life of the equipment, and low average expansion costs are all the advantages of effective CI deployment programs in an enterprise. Caffyn (1999) described CI as an approach that focuses on gradual innovation and includes the whole enterprise. CI can be characterized as a standard process that maximizes output through detecting and removing waste (Dossenbach, 2006).

CI method, though often correlated with these models, can be applied as a stand-alone initiative that results in cumulative changes in organizational performance metrics. CI is made up of three things, namely paths, place, and phase (Bessant and Francis, 1999). The first two are concerned with the organization's ability to accumulate skills and their proper time usage. The third component is organizational routine, which decides how to innovate, learn, and renew.

[Atkinson](#) (1994) suggested the following components for change which the management needs to focus namely commitment of the management, awareness, application, benchmarking, appreciation, and regeneration. [Dabhilkar and Bengtsson](#) (2004) argued that given the committed team of managers, the use of TQM techniques for efficient problem solving becomes easier and strategy implementation brings out operations efficiency through continuous improvements. [Al-Khawaldeh and Sloan](#) (2007) revealed that implementation of continuous improvement activities in companies come across problems related to measuring the performances, financial support, and organizational commitment.

The global market climate is marked by severe competition and increased uncertainty in consumer needs. These developments have left their indelible imprints on various aspects of the manufacturing industry. Due to intensified global competitiveness, all businesses are focused on increasing profits through system simplification and gradual upgrades leveraging new technology. Continuous improvement of production practices is important for the businesses to face the competition, maintain their stake in the global market and local market as well ([Singh and Singh](#), 2018).

The Sultanate of Oman like any other GCC countries is undergoing a critical phase in the economy because of the oil price plunge combined with the ongoing COVID-19 pandemic. The inflation report released on March 2021 reviews the most inflation rates during the month, and price movement in the various provinces. The inflation rate in Oman has been recorded at 3.4 percent an increase from 1 percent in 2020. Since oil prices have gone down and also inflation runs in the economy it is necessary for the manufacturing companies to adopt ways to reduce cost and improve productivity.

Production drives estimated as the key performance indicators ranked 45 out of 100 in 2018 ([World Economic Forum](#), 2018). This will be supporting Oman to become one of the top 20 countries by 2030 ([Oman Observer](#), 2020). Sustainable development of the manufacturing industry in Oman relies mainly on the increase in net exports. Therefore, the Ministry of Commerce and Industry (MOCI) in Oman has introduced trade policies accordingly. With the policies targeting the manufacturing sector, import replacements and export recommendation is necessitated. Manufacturing industries that are competitive in the domestic market will export more. So, CI practices at this juncture gain a lot of attention. CI helps in refining the production practice, reducing the cost of production, etc., and make the price reasonable in the local markets and outside the country.

CI can be achieved through Kaizen techniques which were proven by Japanese experiments. Kaizen is so popular in the western world. The term refers to a method of incrementally improving the normal method of working overtime ([Chen et al.](#), 2001). Kai denotes transition and Zen denotes goodness. The word is derived from the Japanese term Gemba Kaizen, which means 'continuous development and perfection' ([Yanjiang et al.](#), 2006).

The application or incorporation of CI methods or strategies is dependent on several factors. Fewer experiments have been performed in the Omani context to investigate the factors associated with CI. So far, very few studies have been conducted in analyzing the factors correlated to CI in the Omani context and no study was carried out before in exploring the CI application in the Sultanate of Oman. This is the prime reason for undertaking the study and this study adds value to manufacturing industries in Oman.

### Research Questions

The research questions of the study were:

1. What are the CI practices prevailing in the manufacturing companies with regards to Visual Management, Employee Engagement, Leadership, and Risk Management?
2. Which continuous improvement tools have been adopted by the manufacturing companies?
3. What are the critical success factors for implementing CI practices in manufacturing companies?

### Research Objectives

The objectives of the study were:

1. To identify CI practices prevailing in the manufacturing companies with regards to Visual Management, Employee Engagement, Leadership, and Risk Management.
2. To identify continuous improvement tools that have been adopted by the manufacturing companies.
3. To analyze the critical success factors for implementing CI practices in the manufacturing companies

## Review of Literature

Continuous Improvement is an effective strategic instrument for increasing organizational productivity ([Marin-Garcia et al.](#), 2008). Lean is one of the popular best continuous improvement practices ([Welo & Ringen](#), 2015). CI can be linked to a variety of problems, including organization of improvement teams ([Augsdorfer and Harding](#), 1995; [Dabhilkar and Bengtsson](#), 2004), the capacity of the improvement team ([Bessant and Francis](#), 1999; [Jabnoun](#), 2001; [Lee](#), 2004; [Abrahamsson and Gerdin](#), 2006), the association between CI and TQM ([Chapman and Hyland](#), 1997; [Hyland et al.](#), 2000), feedback structures ([Delbridge and Barton](#), 2002), as well as performance metrics and CI operations' supporting systems ([Bechet](#), 2000).

Although an efficient quality improvement program is one of the primary conditions for achieving and maintaining operational performance in a competitive environment, shortcomings in executing effective continuous improvement plans surpass achievements ([Anand et al.](#), 2009; [De Morais et al.](#), 2012).

### Visual Management (VM)

Many organizations face major challenges in providing the right information to the concerned people at the appropriate moment efficiently so that the best decisions are made for suitable actions ([Harris and Harris](#), 2008; [Tezel et al.](#), 2010). VM acknowledges that the concept lets shop floor staff and supervisors understand manufacturing processes by simply visualizing the importance of their jobs in a responsive manner ([Tezel et al.](#), 2016).

### Employee Engagement

Employee engagement is a kind of strategy for the sustainability of the organization in the long run through mutual commitment between the employees and the organization ([Taneja et al.](#), 2015). Employee engagement entails communicating the value of CI to workers as well as defining mutual objectives that are shared by all employees. This includes encouraging training, leadership, collaboration, or the establishment of contact networks to access and disseminate information and expertise ([Escrig-Tena](#), 2004). The pioneer Lean manufacturing system involved continuous employee participation and engagement ([Maskell et al.](#), 2004) whereas in Kaizen, management keeps improving the standard of the processes for better employee empowerment, etc., without making more investment ([Liker & Hoseus](#), 2008).

### Leadership

In the introduction of continuous process improvement, senior leaders play a vital role ([Das et al.](#), 2011; [Soltani](#), 2005; [Venkateswarlu & Nilakant](#), 2005). According to [Rad](#), (2006), the different approaches to continuous improvement necessitate the support of the senior management and involvement and the employees of such organization will least consider such continuous improvement if it is incompatible with the organization's culture.

### Risk Management (RM)

Risk management of a project is a controlled process that involves the identification of various types of risks which emerge and responding to such risks ([Galli & Kaviani](#), 2017). In an organization, risk management involves deciding which risks to be minimized and which risks should be considered ([Danciulescu](#), 2013). Risk management aims to reduce perils and increase the possibility of good events in an organization ([Choi et al.](#), 2016). Companies should reduce the risk levels that might emerge and risk management will be the critical success factor to overcome the same ([Galli](#), 2018). Companies use risk management to enhance their products in comparison to rivals as RM emphasizes the removal of waste and the reduction in costs ([Avanesov](#), 2009).

From the above review of literature, most of the measurements were drawn. Thus, these instruments utilized in this study were adopted contextualizing to Omani manufacturing industries. The respondents rated the measurement items – 20 critical success factors (CSFs) on a scale of 1 to 5 (Likert Scale). Those CSFs were derived from the above literature of CI as shown in Table 1.

**Table 1 Measurement of Constructs**

#	Instruments	Statements	Authors
1	Visual Management	5	<a href="#">Tezel et al.</a> (2016)
2	Employee Engagement	5	<a href="#">Escrig-Tena</a> (2004)

3	Leadership	5	<a href="#">Das et al. (2011)</a> ; <a href="#">Soltani (2005)</a> ; <a href="#">Talib et al. (2011)</a> ; <a href="#">Venkateswarlu &amp; Nilakant (2005)</a> ; <a href="#">Rad (2006)</a>
4	Risk management	5	<a href="#">Danciulescu (2013)</a>

### Research Methodology

Based on the above literature review, a questionnaire was prepared which is meant to provide the basis for CI practices of the manufacturing companies in Oman. It included the following parts viz.

1. Demographic information
2. Manufacturing companies experience with CI tools and techniques
3. Company success factors
4. Critical success factors for CI implementation in manufacturing companies in Oman.

The survey was sent to 75 manufacturing units selected at random from the Public Establishment for Industrial Estate database and 146 completed questionnaires were obtained out of 200 questionnaires mailed. The data was analyzed for reliability, robustness, ranking tests using Statistical Package for Social Statistics (SPSS).

### Findings

Cronbach alpha score was 0.81 passes the minimum requirement ([Nunnally, 1960](#)).

**Table 2 Demographic details of the respondents**

Characteristics		Frequency	%
Gender	Male	83	56.8
	Female	63	43.2
Age	18-25	13	8.9
	26-35	88	60.3
	36-45	40	27.4
	46-55	4	2.7
	56-60	1	0.7
Designation	President	6	4.1
	Vice President	15	10.3
	Director/Manager	16	11.0
	Supervisor/Foreman	39	26.7
	Operator/Technician	70	47.9
Experience in the Current Position	0-5 years	75	51.4
	6-10 years	45	30.8
	11-15 years	15	10.3
	16-20 years	9	6.2
	21-25 years	2	1.4
Current Department	Corporate	23	15.8
	Quality	12	8.2
	Manufacturing	26	17.8
	Logistics	7	4.8
	Finance	14	9.6
	Marketing	6	4.1
	Sales	4	2.7
	Regulatory	1	0.7
	Others	53	36.3
Number of Employees	0-100	39	26.7
	101-300	25	17.1
	301-500	18	12.3
	501-1000	29	19.9
	More than 1000	35	24.0
	Visual Management only	6	4.1

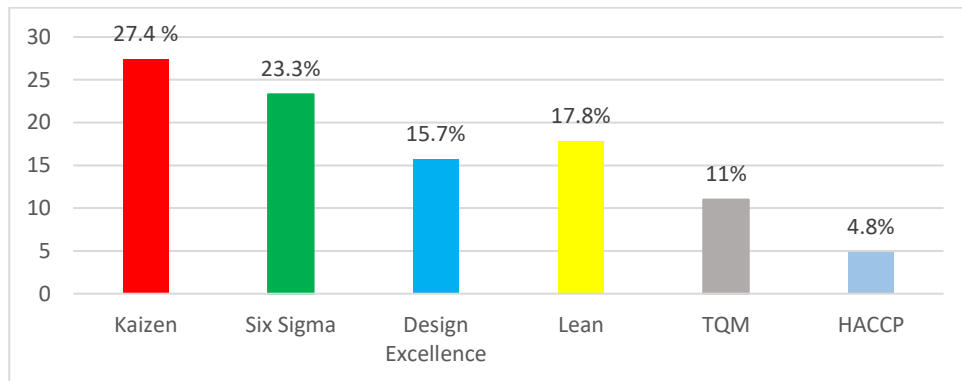
CI Critical Success Factors of the companies	Employee Engagement only	6	4.1
	Risk Management only	28	19.2
	Leadership only	19	13.0
	Employee Engagement & Leadership	14	9.6
	Visual Management, Risk Management & Leadership	6	4.1
	All the four	67	45.9
Duration of the use of CI tools and techniques	0-5 years	60	41.1
	6-10 years	45	30.8
	11-15 years	26	17.8
	16-20 years	7	4.8
	21-25 years	1	0.7
	More than 25 years	1	0.7
	Did not use any CI	6	4.1
CI program site / Corporate initiative	Site Specific	50	34.2
	Corporate Initiative	82	56.2
	Not applicable	14	9.6
Average Sales	Increased	98	67.1
	Constant	37	25.4
	Decreased	11	7.5
Average Cycle time	Decreased	85	58.2
	Increased	27	18.5
	Not sure	34	23.3
Products Recalled	Yes	67	45.9
	No	48	32.9
	Not sure	31	21.2
Type of Products	Aluminium	5	3.5
	Steel	4	2.8
	Building Materials	10	6.9
	Cement	2	1.4
	Quick Lime	1	0.7
	Ceramic	2	1.4
	Chemicals	1	0.7
	Electrical Switch Board	4	2.8
	Oil & Gas	35	24.5
	Food	3	2.1
	Iron-ore and pellets	2	1.4
	Paper	1	0.7
	Plastics	1	0.7
	Methanol Gas	3	2.1
	Propylene	1	0.7
	Polymers	1	0.7
	Bottles	2	1.4
	Sulphuric Acid	3	2.1
	Others	65	43.4

Source: Questionnaire

**Table 3 CI Tools & Techniques used by the companies**

CI Tools	Frequency	%
Kaizen	40	27.4
Six Sigma	34	23.3
Design Excellence	23	15.7
Lean	26	17.8
TQM	16	11.0

HACCP	7	4.8
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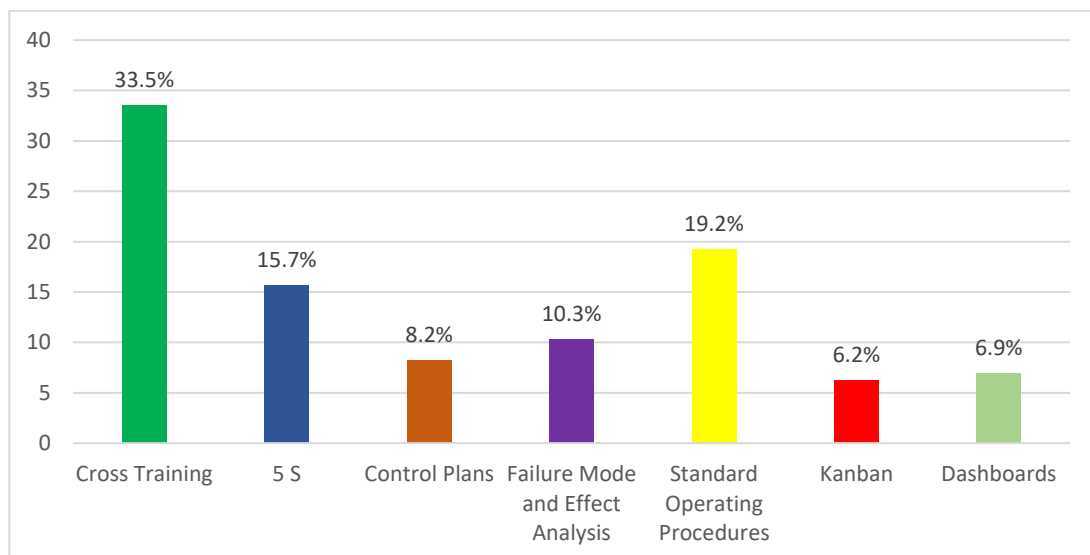


**Figure 1 CI Tools & Techniques used by the companies**

Figure 1 shows the various CI tools and techniques used to ensure successful implementation of CI in their companies and the popular tool among the respondents i.e. Kaizen.

**Table 4 Visual Management (VM) Tools used by the companies**

Visual Management Tools	Frequency	%
Cross Training	49	33.5
5 S	23	15.7
Control Plans	12	8.2
Failure Mode and Effect Analysis	15	10.3
Standard Operating Procedures	28	19.2
Kanban	9	6.2
Dashboards	10	6.9



**Figure 2 Visual Management (VM) Tools used by the companies**

Figure 2 shows the various VM tools used to ensure successful implementation of CI in their companies and the popular tool among the respondents i.e. Cross Training.



**Table 5 Visual Management (VM) Tools**

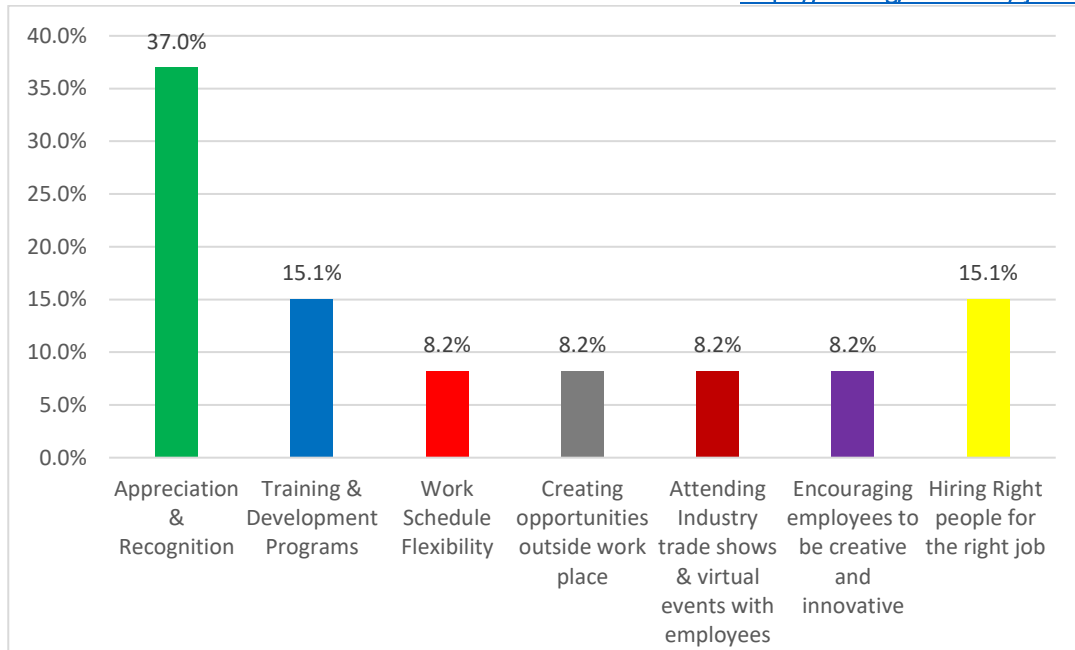
Statements	SD	D	N	A	SA	KS value	$\chi^2$	P value
1. Top management supports the implementation of VM	36 24.7%	35 24.0%	42 28.7%	20 13.7%	13 8.9%	.166	68.931	.000
2. VM tools allows you to detect the deviations from the standards	32 21.9%	40 27.4%	44 30.1%	23 15.8%	7 4.8%	.176		
3. VM strategy enables the flow of information	31 21.2%	32 21.9%	53 36.3%	21 14.4%	9 6.2%	.201		
4. VM facilitates distribution of responsibilities among employees	36 24.7%	36 24.7%	45 30.8%	22 15.0%	7 4.8%	.176		
5. VM leads to providing the best solution	32 21.9%	30 20.5%	49 33.6%	26 17.8%	9 6.2%	.193		

**Null Hypothesis.1:** No relationship exists between the VM tools and the choices of the respondents.

Table 5 shows p-value < 0.05. So null hypothesis 1 got rejected. i.e., it is understood that there exists a significant relationship between the VM tools and the choices of the respondents. From K-S values of Kolmogorov-Smirnov test, 'VM strategy enables the flow of information' ranked first (0.201); 'VM leads to providing the best solution' ranked second (0.193) and both 'VM tools allow you to detect the deviations from the standards' and 'VM facilitates the distribution of responsibilities among employees' ranked third (0.176).

**Table 4 Ways of Employee Engagement used by the companies**

Ways of Employee Engagement	Frequency	%
Appreciation & Recognition	54	37.0
Training & Development Programs	22	15.1
Work Schedule Flexibility	12	8.2
Creating Opportunities outside the workplace	12	8.2
Attending Industry Tradeshow/Virtual Events with Employees	12	8.2
Encouraging employees to be creative/innovative	12	8.2
Hiring the right people for the right job	22	15.1



**Figure 3 Ways of Employee Engagement used by the companies**

Figure 3 shows the various ways of Employee engagement used to ensure successful implementation of CI in their companies and the popular means among the respondent companies was Appreciation & Recognition.

**Table 6 Employee Engagement**

Statements	SD	D	N	A	SA	$\chi^2$	P-value
1. The top management supports employees to achieve continuous improvement	29 19.9%	29 19.9%	47 32.1%	23 15.8%	18 12.3%	17.379	.002
2. The organization provides professional training	31 21.2%	35 24.0%	41 28.1%	26 17.8%	13 8.9%	16.621	.002
3. Organization atmosphere is full of spirit and cooperation	25 17.2%	35 24.0%	37 25.3%	30 20.5%	19 13.0%	8.207	.084
4. Your work is always meaningful	25 17.1%	44 30.1%	29 19.9%	34 23.3%	14 9.6%	18.000	.001
5. Your organization encourages creativity	28 19.2%	37 25.3%	32 21.9%	33 22.6%	16 11.0%	9.862	.043

The p-value of all the statements in Table 6 was less than .05 except statement NO.3 whose value (.084) was more than .05. So, eliminating that statement, the analysis was carried out again and the result was as follows:



**Table 7 Employee Engagement**

Statements	SD	D	N	A	SA	KS value	$\chi^2$	P-value
1. The top management supports employees to achieve continuous improvement	29 19.9%	29 19.9%	47 32.1%	23 15.8%	18 12.3%	.166	74.034	.000
2. The organization provides professional training	31 21.2%	35 24.0%	41 28.1%	26 17.8%	13 8.9%	.176		
4. Your work is always meaningful	25 17.1%	44 30.1%	29 19.9%	34 23.3%	14 9.6%	.176		
5. Your organization encourages creativity	28 19.2%	37 25.3%	32 21.9%	33 22.6%	16 11.0%	.193		

**Null Hypothesis 2:** No relationship exists between the VM tools and the choices of the respondents.

Table 7 shows p-value < 0.05. So the null hypothesis 2 got rejected. i.e., it is understood that there exists a significant relationship between employee engagement and the choices of the respondents. From K-S values of Kolmogorov-Smirnov test, 'Your organization encourages creativity' ranked first (0.193); both 'The organization provides professional training' and 'Your work is always meaningful' ranked second (0.176) and 'The top management supports employees to achieve continuous improvement' ranked third (0.166).

**Table 8 Leadership Style adopted by the companies**

Leadership Style	Frequency	%
Top Down	37	25.3
Bottom Up	60	41.1
Participative	4	33.6

Table 8 shows the various Leadership style adopted to ensure the successful implementation of CI in their companies.

**Table 9 Leadership Practices**

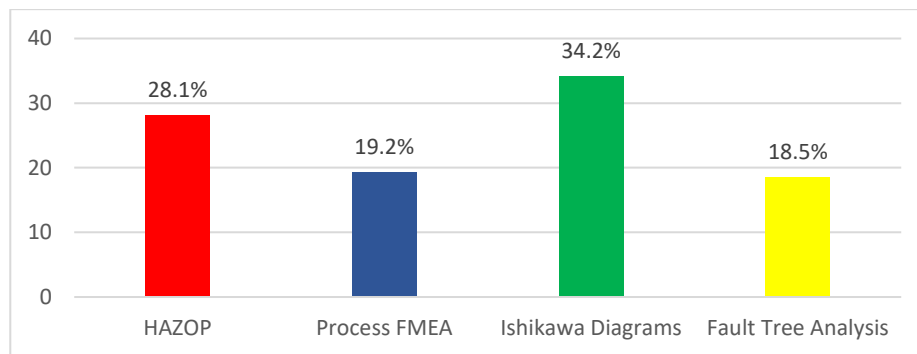
Statements	SD	D	N	A	SA	KS value	$\chi^2$	P-value
1. The organization has a kaizen team leader	31 21.2%	27 18.5%	47 32.2%	25 17.1%	16 11.0%	.174	42.667	.001
2. The top management supports the change journey	33 22.6%	36 24.7%	33 22.6%	34 23.3%	10 6.8%	.178		
3. The leaders ensure that every staff job can add value to the customers	27 18.5%	32 21.8%	45 30.8%	29 19.8%	13 8.1%	.168		
4. The team leaders provide effective communication between the staff	23 15.7%	41 28.1%	36 24.7%	27 18.5%	18 13.0%	.188		
5. The leaders support Gemba commitment for continuous improvement achievement	30 20.5%	33 22.6%	46 31.5%	22 15.1%	15 10.3%	.164		

**Null Hypothesis.3:** No relationship exists between the Leadership Practices and the choices of the respondents.

Table 9 shows  $p\text{-value} < 0.05$ . So the null hypothesis 3 got rejected. i.e., it is understood that there exists a significant relationship between the Leadership Practices and the choices of the respondents. From K-S values of Kolmogorov-Smirnov test, 'The team leaders provide effective communication between the staff' ranked first (0.188); 'The top management supports the change journey' ranked second (0.178) and 'The organization has a kaizen team leader' (0.174).

**Table 10 Risk Management Tools adopted by the companies**

Risk Management Tools	Frequency	%
HAZOP	41	28.1
Process FMEA	28	19.2
Ishikawa Diagrams	50	34.2
Fault Tree Analysis	27	18.5



**Figure 4 Risk Management Tools adopted by the companies**

Figure 4 shows the various Risk Management tools used to ensure successful implementation of CI in their companies and the popular tool among the respondents i.e. Ishikawa Diagrams.

**Table 11 Risk Management (RM) Tools**

Statements	SD	D	N	A	SA	KS value	$\chi^2$	p value
1. The organization has an effective RM team	25 17.0%	43 29.5%	47 32.2%	20 13.7%	11 7.6%	.182	55.444	.000
2. The RM is applied to achieve a high level of reliability and profitability	26 17.8%	40 27.4%	33 22.6%	31 21.2%	16 11.0%	.190		
3. The risk management plan allows you to identify and treat the risk efficiently	35 24.0%	42 28.7%	37 25.3%	23 15.8%	9 6.2%	.194		
4. The risk management process eliminates non value added activities	21 14.3%	44 30.1%	49 33.6%	21 14.4%	11 7.6%	.183		
5. The RM plan identifies roles and responsibilities towards risk	23 15.8%	47 32.2%	43 29.5%	19 13.0%	14 9.5%	.201		

**Null Hypothesis.4:** No relationship exists between the Leadership Practices and the choices of the respondents.

Table 11 shows p-value < 0.05. So the null hypothesis 4 got rejected. i.e., it is understood that there exists a significant relationship between the Risk Management Tools and the choices of the respondents. From the K-S values of Kolmogorov-Smirnov test, 'The RM plan identifies roles and responsibilities towards risk' ranked first (0.201); 'The risk management plan allows you to identify and treat the risk efficiently' ranked second (0.194) and 'The risk management process eliminates non-value-added activities ranked third (0.183).

## **Discussions**

### ***Average Sales***

About the company average sales, the majority of the respondents (67.1%) declared that the average sales had increased over the past three financial years (2017-2020) whereas 25.3% of the respondents reported that the average sales were constant over the past three financial years. 7.5% of the respondents reported that their company's average sales had decreased over the past three financial years.

### ***Decrease in Average Cycle Time***

The majority of the respondents (58.2%) reported that the average cycle time decreased at their site, whereas 23.3% of the respondents were unsure of the same. 18.5% of the respondents disagreed that average cycle time decreased at their site.

### ***Recalling of Product in Site (Including Voluntarily)***

A majority of 45.9% respondents agreed that their site recalled the product in the last financial year (2018 - 2019) whereas 32.9% of the respondents were against the fact that their site recalled the product and 21.2% were unsure of the fact that their site recalled the product.

### ***Preferred Critical Success Factors of the Companies***

Among the VM tools, the respondents preferred 'VM strategy enables the flow of information' followed by 'VM leads to providing the best solution', and 'VM tools allow you to detect the deviations from the standards' and 'VM facilitates the distribution of responsibilities among employees' ranked third.

Among the employee engagement factors, the respondents chose 'Organization encourages creativity' followed by both 'The organization provides professional training', 'Your work is always meaningful', 'VM tools allow you to detect the deviations from the standards', and 'The top management supports employees to achieve continuous improvement'.

Among the leadership practices, the respondents selected 'The team leaders provide effective communication between the staff' followed by 'The top management supports the change journey'. 'VM tools allow you to detect the deviations from the standards', and 'The organization has a kaizen team leader'.

Among the risk management tools, the respondents selected 'The RM plan identifies roles and responsibilities towards risk' followed by 'The risk management plan allows you to identify and treat the risk efficiently', and 'The risk management process eliminates non-value-added activities'.

### ***Savings of the companies due to continuous improvement projects***

35.6% of respondents have recorded that their company has received more than OMR 1,00,000 annual savings from continuous improvement projects, 32.4% have recorded that their company has received less than OMR 10,000 annual savings from continuous improvement projects, 21.9 percent respondents have recorded that their company has received savings between OMR 10,001 – OMR 25,000 and 11percent respondents have recorded that their company has received savings between OMR 50,001 – OMR 1,00,000 in the financial year 2018-2019.

## **Conclusion**

The overall sales have risen, while the average processing time has declined and also the product recalls have risen. The majority of the manufacturing firms were using only the CI program for the past five years. However, since these projects took an average of 7 years to execute, there were not substantial cost savings for these businesses. The overall sales increased, while the average processing time had declined and the product recalls also had increased.

It was observed that VM strategy enables the flow of information and provides the best solutions in detecting deviations from the standards. It was also observed that the top management supports employees to achieve continuous improvement through effective communication. The important risk management tools were risk management plans to identify and treat the risk efficiently. Therefore, the most important factors for the effective implementation of CI in industrial firms were effective communication, top management encouragement, and employee involvement, and a conducive organizational atmosphere.

This study identified the use of CI tools through the survey from the managers of the production units in the manufacturing industry. All critical success factors assessed in this study influenced the company's decision to implement CI. These critical success factors, combined with the continuous improvement realized by manufacturing companies, strongly suggested that the continuous improvement tools are an integral component of business strategy. Organization atmosphere, Top management, Effective communication, and Organization creativity are the important critical success factor in CI implementation. The results of this study were similar to the results of the study by [Antony et al.](#) (2015) in which similar two factors were found to be influential in small and medium-sized manufacturing enterprises in the UK. Verification of these results with a larger, more representative sample of the Omani manufacturing industry is recommended.

### Acknowledgment

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