

Critical Success Factors for the implementation of Operational Excellence

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Abstract

This paper presents the process of implementation Operational Excellence (OE) in companies that have achieved a competitive advantage, through the application of Critical Success Factors (CSF). With this in mind, the elements that make up this concept are defined and have been obtained from a set of 122 articles from 2005 through 2018 and are presented by different authors that applied similar concepts. The articles were selected using a series of keywords in the databases that appear in Scopus, ProQuest, Emerald, Science Direct and Web of Science and filtered in a population analysis, which we will see more in detail in the literature review. Also, the CSF that influence the application of OE were analyzed in this compendium. The study also includes an analysis and a development already carried out, that has been successfully implemented, where the steps to be followed for their execution are identified. These CSF are visualized from a Lean perspective, where we propose a type of execution. Likewise, the critical success factors of Six Sigma are reviewed for comparison. Subsequently, a description of the operation of these critical factors of Lean and Six Sigma are made, proposing a different perspective of OE.

Keywords

Critical Success Factors, Operational Excellence, Lean Six Sigma, Productivity.

1. Introduction

According to Dora et al. (2013), the skill of the workforce, in-house expertise and the organizational culture are critical factors for a successful implementation of lean manufacturing practices and essential elements for an organization to achieve a competitive advantage, so they can control processes and actions to achieve organizational objectives. Likewise, Resende et al. (2018) conducted a study where they assimilated the collaboration and its main factors of interrelation between the organizations that are part of the cooperation and competition network. In addition, they analyzed the critical success factors related to business cooperation and the structure for its recognition. Part of its competitive advantage focuses on the main strategic factors that induce competitors to cooperate, as well as on the interactions between cooperation and competition. Thus, CSF are limited to key variables or conditions that have an impact on how an organization meets successfully and effectively. In a study related to food processing in SMEs by Dora et al. (2013), they applied and identified operational excellence to define the critical success factors and thus be able to help companies and professionals to focus on the quality improvement methods, as well as lean manufacturing to increase production efficiency. The scope of our research is to be able to define the critical success factors that have the greatest impact on organizations, in order to be able to sustain the best practices and a continuous improvement culture.

2. Literature Review

During the research, articles were consulted in different databases like Scopus, Web of Science, ProQuest, Emerald and Science Direct to learn more about the concepts and applications of the different CSF in organizations. The explorations of these articles were through keywords or critical elements, such as the following: "operational excellence", "performance excellence", "operations excellence", "business excellence", "Enterprise excellence", "lean six sigma", "Continuous improvement", among others. In these articles, CSF were found in successful and failed implementations, we reviewed the context and the implementation method that they carried out. Likewise, we collected all the information obtained from this investigation, including the title, author, reference, year, source, complete text,

publisher and the critical factor. Upon obtaining this information, a total of 122 articles were reached for review. There are several factors that can impede the study of a total population. For this reason, we decided to select a representative sample where results are provided approximately to those that would be obtained in a study of the total population. The data to carry out the study of the population is shown in table 1, where the confidence level is of 90%, as shown in Figure 1.

Table 1. Data to obtain the size of the population

For a statistical confidence of 90%	
N	122
n	43
Z	1.65
P	50%
Q	50%
l	10%

According to the equation 1:

$$n = \frac{NZ^2pq}{1^2(N-1) + Z^2pq}$$

Equation 1: Formula to obtain the study of the population

Where:

n= simple size

N= total segmented population

Z= confidence level

p= probability of something happening

q= (1-p) = probability that it does not happen

l= maximum error allowed

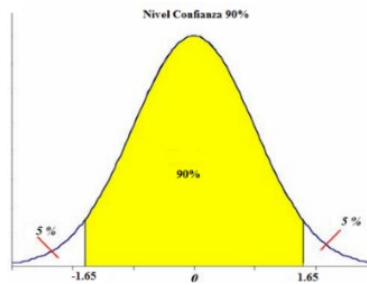


Figure 1. Confidence Level of 90%

In addition, Figure 2 shows the result in percentage obtained from journals consulted with impact factor range of 0.05-2.401 against the total number journals available in our research. On the other hand, we verified the total numbers of journals within the same impact factor range as our research were we show the results in Figure 3:

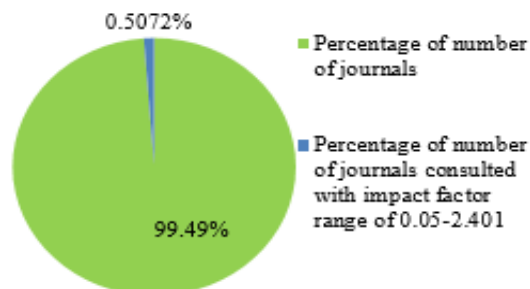


Figure 2. Percentage of number of journals consulted with impact factor range of 0.05-2.401

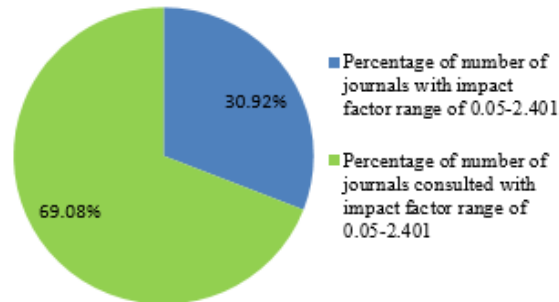


Figure 3. Percentage of number of journals consulted with impact factor range of 0.05-2.401 within the total number of journals with the same range

The evaluation of the articles found, relate to the management effect in OE. The investigation has been carried out by us from 2005 through 2018. The research procedure is an iterative process carried out by placing the keywords. In Table 3, which is shown in the results section, we break down the critical factors found by the different authors, and we specify more details of our source in our references.

3. Results

To locate the different critical factors establish by the different authors inside a management system, we put them into the quality management system of the international standard of ISO 9001-2015. With this, we can obtained which is the most important factor, as well as the critical success factor most used in the industry. The ISO 9001-2015 established seven different factors that are: 4) Organization and its context, 5) Leadership, 6) Planning, 7) Support, 8) Operation, 9) Performance evaluation and 10) Improvement. As a result, we break down the analysis of the 43 articles consulted with their critical factors define inside of each factor of the management system in Table 3 - 9. The first column makes a reference to each of the critical factor consulted that applies inside the Management System, and the column reference, mentions from where the information was extracted from the reference list.

Table 3. Critical Factors within the Management System ISO 9001-2015 4) Organization and its context

Management System ISO 9001:2015 4) Organization and its context Critical Factors	Reference
Organizational culture	3
History and identity (culture); Sharing and Equity; Management of Conflicts and Incompatibilities; Competitive Cooperation; Adaptability and Alignment; Interdependence and Heteronomy; Externalities	4
Increase in team morale; Improvement of the company's reputation	6
Culture change	7
Policy and strategy; Stakeholder Management	9
Projects selected for important stakeholders	10
Fragmented implementation strategy	15
Setting project goal; Goals need to be realistic for both organizations; Goals need to be adapted if circumstances change; System for communication with stakeholders is essential	16
Organization's Strategy and vision; Organization's infrastructure of the workshop	21
Poor organization capabilities; Weak infrastructure; Replicating another organization's LSS strategy; Lack of understanding of how to get started;	23
Strategy	26
Finance; Organizational culture; Taylor your approach to your culture	28
Strategic alignment; Organizational learning	29
Competition; Effective System; Organizational Support	30
Company strategy; Structure	32
Organizational Culture	35
Organization support	36
Time; Cost; Quality	38
Organizational cooperation; Project Selection; Time management	39

Integrating organization self-assessment; Involving key stakeholders in the quality improvement process	40
Sources of finance; Political; Economic; Technological; Social Environment	41

Table 4. Critical Factors within the Management System ISO 9001-2015 5) Leadership

Management System ISO 9001:2015 5) Leadership Critical Factors	Reference
Cost Leadership	1
Leadership and management	4
Autocratic leadership	5
Top Management commitment and support; Involvement of employees; Project management skill	7
Leadership and team	9
Leadership; Strategic planning; Operation management	11
On site coaching	12
Leadership from master black belts, black belts and green belts; Dedication; Commitment; Honesty; Integrity; Self-confidence; Top leadership commitment	14
Commitment of Management; Persistence; Confidence	15
Balanced implementation team and top Mgt. skillset; Identification of customer needs	17
Communication & interaction in the organization; Change management and behavior patterns	21
Lack of top management attitude, commitment and involvement; Weak link between the CI projects and the strategic objectives of the organization; Resistance of culture change; Lack of leadership skills and visionary and supportive leadership; Lack of awareness of the benefits of LSS; Lack of employee engagement and participation/lack of team autonomy	23
Promote user satisfaction	24
Leadership; Measurement, analysis and knowledge management	26
Leadership and management	28
Leadership; People focus; Customer focus	29
Commitment; Top Management support	30
Top management	33
Change Management	34
Management commitment and leadership; Commitment to quality; Customer focus	37
Management commitment; Motivation to change	39
Leadership and human resources; Organizational culture and sustainability of the organization	41
Leadership Accountability	43

Table 5. Critical Factors within the Management System ISO 9001-2015 6) Planning

Management System ISO 9001:2015 6) Planning Critical Factors	Reference
Cost reduction; Risk reduction	6
Enhance value by identifying and eliminating waste to work more efficiently with limited resources; Adds environmental and social dimension to the consideration of economic earnings; Offers a rigorous and disciplined structure for executing problem solving and improvement initiatives	8
Full time dedicated black belts; Clearly allocated green belts; Strategic project selection; Periodic and constant project review	10
Quality risk management	21
Poor project selection and prioritization; Wrong selection LSS tools; Lack of clear vision and future plan; Lack of an effective model or roadmap to guide the implementation; Lack of estimation of implementation cost	23
Decrease costs	24
Reducing the cost of poor quality; Reducing the incidence of defective products or services	25
Cost Saving	30
Decreased healthcare costs and postoperative pain medication administration	31
Reduced energy demands; Reduced material costs	33
Financial savings	35
CI methodology	36

Planning, doing, and evaluating	40
Theory of inventive problem solving (TRIZ)	42

Table 6. Critical Factors within the Management System ISO 9001-2015 7) Support

Management System ISO 9001:2015 7) Support Critical Factors	Reference
Workforce; In house expertise manufacturing; Financial Capabilities	3
Complementarity and reciprocity (synergy); Production Competence; Innovation Competence; Financial Resources; People Management; Intangible Resources	4
Human Capital Skills	5
Profitability increase; Efficient use of resources;	6
Education and training; Communication; Skills and expertise; Reward system	7
Resources; Contracting; Project Management; External factors	9
IT or knowledge management structure; Long term plus short term benefit project selection; Behavioral characteristics of black belts and green belts; Training for master black belts and black belts; Massive training in yellow belts or white belts; Master black belts support provided; Use of six sigma tools	10
Resource	11
Strengthen the motivation of the teams to enroll the program; Consolidate and develop expertise and resources; Build alliances, Synergy between teammates	12
Limited resources for SMEs; Resistance to change; Employee Identity; Employee Engagement	15
Supportive workshops	16
Project management with sufficient resources; Employee quality; Knowledge and learning; Effective communication	17
Economic and social benefits	18
Collection of data	20
Human Resource	21
Standardization of technology; Compatibility of technology with the physical environment; Pedagogically sound educational approaches; Personal innovativeness	22
Lack of training and education; Lack of resources (financial, technical, human, etc.); Lack of consideration of the human factors; Lack of understanding the different types of customers/VOC; Lack of process thinking and process ownership; High implementation cost; Lack of experience in LSS project implementation; Lack of awareness of the LSS; Ineffective project management; Poor selection of candidates for belts training; Threat of redundancy; Time consuming; Lack of application of statistical theory; Poor communication	23
Workforce	26
Skills and expertise; Assign dedicated experienced resources; Employee training and empowerment	28
Partnership development; Fact-based processes management; Social responsibility	29
Coworker Support; Employee Confidence; Empowerment; Training	30
Communication	31
Support mechanisms; Behaviors that stimulate innovation; Communication	32
Training; Workshops; Tailor made coursed and self-study	33
Human factors; Technical Factors; Process Management	34
Rewards; Communication; Training; Self efficacy; Empowerment; Ease of participation in CI; Job satisfaction; Social influence; Intention to participate; Employee participation	36
Employee involvement	37
Lean Knowledge; Communication system; Training; Flexibility	39
Washington accord; Outcome based education (OBE); Problem based learning (PBL); Project based learning; Case based learning; Internship	42

Table 7. Critical Factors within the Management System ISO 9001-2015 8) Operation

Management System ISO 9001:2015 8) Operation Critical Factors	Reference
Control and Standardization; Governance	4

Understanding the tools and techniques within six sigma methodology; Linking the six sigma method for customers; Linking the six sigma method to the business strategy; Linking six sigma method to suppliers; Linking the six sigma method to human resources	7
Clear roles in the six sigma structure; Adherence of project management with DMAIC steps	10
Traceable operation cost	17
Process/procedure; The management of quality controls	20
Narrow view of LSS as a set of tools, techniques and practices; Poor execution; Weak linking to suppliers	23
Operations	26
Process capability; Production lead time; Work in process inventory	35
Production control	37

Table 8. Critical Factors within the Management System ISO 9001-2015 9) Performance Evaluation

Management System ISO 9001:2015 9) Performance Evaluation Critical Factors	Reference
Customer Satisfaction	5
Improve economic, environmental and social performance	8
Success Criteria	9
Measurement, analysis and improvement; Financial results; Customer & market	11
Monitoring and evaluation plan	16
Performance monitoring	17
Environmental benefits to achieve operational excellence	18
Regular monitoring; Evaluation of corrective actions	20
Lack of a performance measurement system; Misalignment between the project aim, the main goals of the company and the customer demand	23
Increase efficiency	24
Results; Customers	26
Metrics to drive progress and communicate	28
Results focus	29
Customer Satisfaction	30
Improving production and functional parameters	33
Defects percentage	35
Link to customers	39
Incorporate multiple performance-based perspectives	40

Table 9. Critical Factors within the Management System ISO 9001-2015 10) Improvement

Management System ISO 9001:2015 10) Improvement Critical Factors	Reference
Flexible to incorporate new insights	16
Continuous improvement	20
Sustain continuous improvement	21
Support for Innovation	30
Listening to family's perspectives to improve clinical decision making and patient outcomes	31
Ecological improvement	33
Process improvement	37
Implementing specific quality improvement strategies	40
Continuous quality improvement	42

When breaking down the critical factors within the management system, we worked with 283 different critical factors that the 43 different authors applied in their organizations or projects. In this case, the Support factor is the most used by the authors, as we can see in Figure 4.

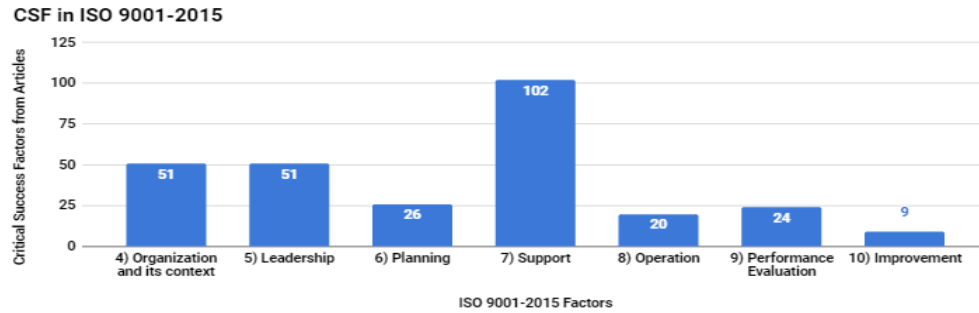


Figure 4. Critical Success Factors applied in ISO 9001-2015

In order to know the most applied CSF within the Support factor, we divided the CSF in three different sections: Workforce, Resources and Communication. After analyzing the information, it gave us the result that the Workforce is the CSF most applied according to the authors and our research. The workforce is composed by employees, their personal and professional skills, their empowerment, their competence and their awareness. In figure 5 we can observe that Workforce has a greater impact with respect to the other two CSF analyzed.

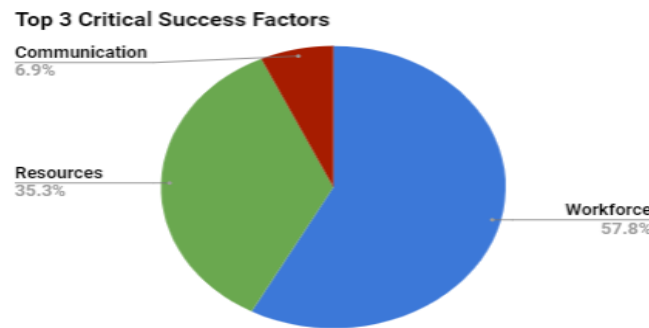


Figure 5. Top 3 Critical Success Factors

4. Conclusions

The approach is to provide the benefits and competitive advantages of applying the most critical success factors at the different levels of an organization. Operational Excellence can only be successfully implemented if the organization can identify and work in the areas of opportunity, applying the most relevant critical factors in order to achieve success and competitive advantage. This results will help organizations and professionals to focus on methods of continuous improvement and lean manufacturing, to increase the efficiency of their production or services. In this article, an analysis of the critical success factors for the implementation of Operational Excellence in the organization has been presented, based on information and facts applied in different sectors, such as automotive, food, health and others. The factor of Support was the one that was the most used by these authors in our research and within this, the critical factor that has more impact is Workforce with 57.8%. Although the workforce is the most important one, we should not stop considering the resources and communication factors to achieve Operational Excellence.

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