









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.

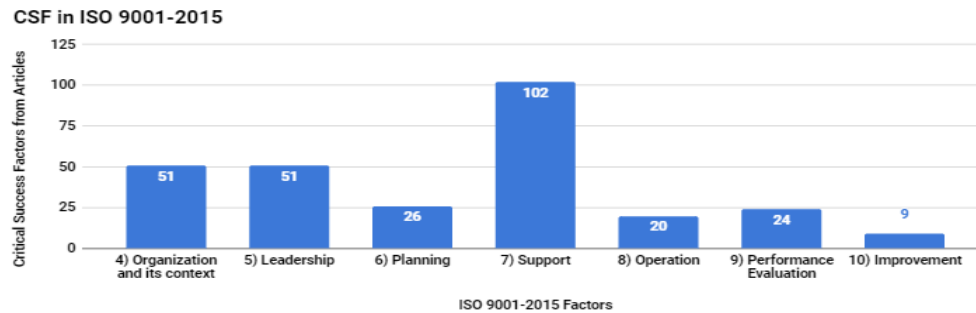


Figure 4. Critical Success Factors applied in ISO 9001-2015

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.

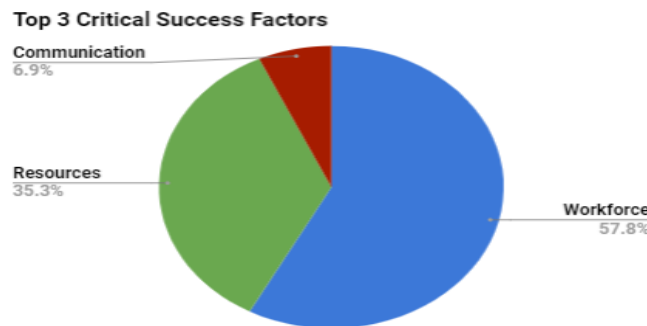


Figure 5. Top 3 Critical Success Factors

## 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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