

## **Analysis of Critical Success Factors Impacting the Project Success**

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### **Abstract**

This paper examines the relationship between different critical success factors (CSFs) and project success. Nine factors based on repetition/ number of occurrences in literature review are considered which impact the project success the most. This study is based on the data from manufacturing companies - Micro, Small, Medium Enterprises (MSME) sector in and around Pune, India.

This paper attempts to provide a connection between various CSFs and project success. The purpose of this paper is to present a retrospective on how project success is affected by certain factors. Project management is a driver of organisational strategy hence this paper focuses on CSFs from Project Management angle. Every project manager dreams and works hard for his project to be successful. Hence knowing and understanding of project success factors is of vital importance for a project manager. This study will provide a framework of Project management CSFs to project managers. The CSFs revealed in this study converged with vital factors for a successful project.

This study provides insights to the Project managers so that they can evaluate the project success by an in-depth study of the CSFs.

A conceptual model and nine factors were considered for MSME manufacturing projects. These factors were selected based on their importance to manufacturing projects and their repeated occurrence in the literature review related to CSFs. The top nine factors were selected based on the occurrence in the literature review.

The framework, conceptual model, analysing the CSFs for manufacturing industries and highlighting the “scope of the project”, “support from top management” and “team capability” factors are the major contributions of this research work.

**Keywords:**

MSME manufacturing, Critical Success Factors (CSFs), Project success, Project Management

**Paper type:** Research paper

**Introduction:**

In recent times, the magnitude of project activity is rapidly growing. Projects are being used for every domain- system process, construction, product development, new service initiation.

**Project and Project Management:**

From the project management perspective, “a project is a temporary endeavour with a specific beginning and end”. This is the standard definition of a project given by the Project Management Book of Knowledge -PMBOK.

“Project management is the application of knowledge, skills and techniques to the project tasks to meet the project prerequisites” [4]

**Why Project management is important:**

Ahsan and Gunawan analysed a hundred projects in Asian countries (Bangladesh, India, China and Thailand); they determined due to the absence of Project management structures; the majority of projects were delayed/ abandoned. [12]. To eliminate such challenges, organisations implement project management strategies/practices. [12].

The correlation between project management and project success is significant, hence the importance of project management cannot be undermined. [23]

**Project Success:**

It has been recognised over the last fifty years that project management is an effective tool for managing projects. However, the success of project management is dependent on project success. Organisations want to attain stability in these projects, and hence the project failure/ delays cannot be ignored. Organisations are trying to improve their methods of managing projects to achieve higher project success rates. The modern business environment is very unstable which in turn reduces the rate of project success. [1]

Various researchers have identified numerous factors which impact project success. According to Nara and others, defining project success is not easy [10].

It is of prime importance that organisations pay attention to what is project success and how is it impacted. Project success is measured in terms of the overall objectives of the project. [7]

### **CSF:**

The term CSF initially appeared in management literature in the 1960s where the main focus was on industry-related CSFs. CSFs can be described as issues that if addressed correctly, significantly increase the likelihood of chances of project success (Mohd & Shamsul, 2011). CSFs are input to Project management practices that can lead to project success directly or indirectly. Understanding CSFs can lead to faster decision making and hence contribute to project success [29]

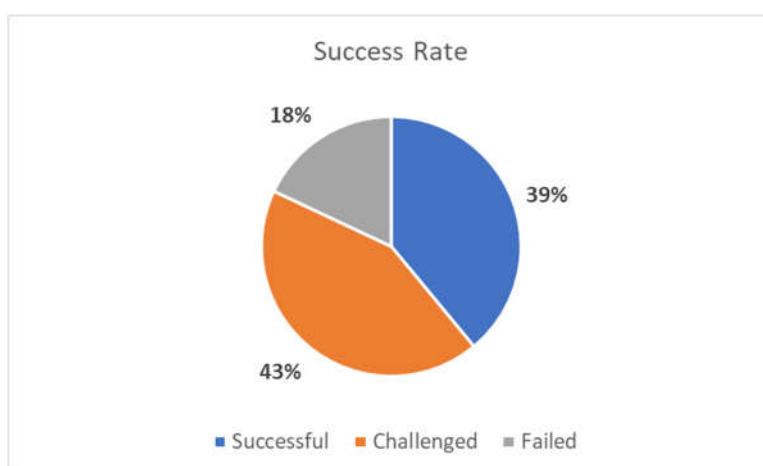
Project managers control the project and need to understand the CSFs affecting their projects. Understanding CSFs better will give project managers a competitive edge which is a relevant factor. Project managers should be mindful of such factors for improving the chances of their project's success. Documentation and investigation of project success factors play a significant role in measuring project success. By analysing the relevant literature, we verify that there are certain CSFs that contribute to project success [1]

Rockart illustrated the concept of CSF and discussed how understanding CSFs can be useful for managers. He stated that CSFs are a few areas for the business to grow where "things must go right" [15]. According to Inayat and others, there is consensus among the researchers that project success depends on the presence of CSFs [17].

The Standish Group had been researching and collecting data for projects all over the world for two decades. According to their report – CHAOS Manifesto, the project status can be successful, challenged and failure. Successful projects have been defined as those that are on time, on budget and have satisfactory implementation. Challenged projects are over budget, late and/or have an unsatisfactory implementation. Failed projects are those projects that were either cancelled prior to completion or not used after implementation. [21]

**Table 1. Success Rate- The Standish Report**

Project	Success Rate
Successful	39%
Challenged	43%
Failed	18%

**Figure 1. Success Rates - The Standish Report**

Referring to Figure 1 and Table 1 suggest, there is scope for research as challenged and failed project rate is quite high.

Some researchers recommend that effective practices like - definition of success must be agreed upon, measurement should be consistent and the use of results for project success.

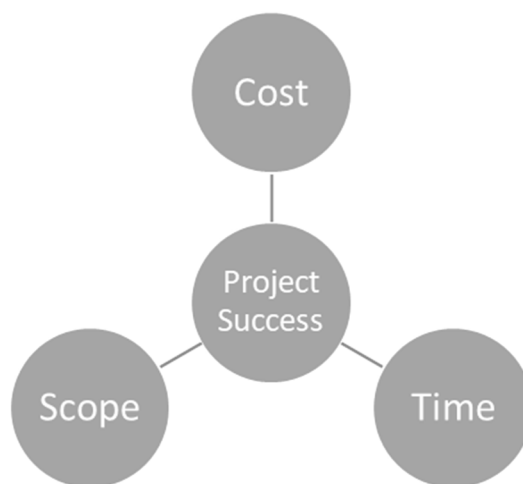
Project success, especially in developing countries like India, is very important for the project stakeholders to sustain national development. [14].

Few studies have been done in the field of MSME for finding impactful CSFs. However, more exploration has to be done in a methodical structure [20].

### **Literature review:**

According to De Wit, the most appropriate measurement for project success are the project objectives. He has mentioned that the criteria for the project to be successful are cost, time and scope [6]. Obviously, for a project to be successful, there are many numerous factors that contribute towards making a project successful. Many researchers have tried identifying project success factors to date.

Many researchers have also stressed upon the iron triangle or triple constraints or project management triangle -cost, time and scope. The early researchers predominantly supported the iron triangle. When the project is delivered to these criteria, it is simple to declare success. [3]



**Figure 2. Iron Triangle**

The most prominent measurement so far for the success of a project has been triple constraint (or iron triangle). This method was invented by Dr. Martin Barnes in 1969 which is also called the traditional method. Figure 2 shows the interdependence of the three aspects of a project. This triangle has been treated as a universal model for project success. (Refer Figure 2)

Terry Cooke-Davies mentions that the project success is measured against the factors cost, scope and time. Time and cost are consistently identified as elements for project success of the iron triangle. [7]

Effectively managing cost, time and scope is the central element to project success. Project managers focus on these three elements as performance metrics. Atkinson also focused on these variables for successful projects [9].

However, the iron triangle does not tell the whole story of project success. Measuring factors other than the iron triangle could provide the missing link for the project's success [9]. Hence, there is a need to study other factors contributing to project success. In this study, we are trying to answer the questions “what factors lead to project success?”, “What are the factors other than time, cost and scope that contribute to project success?”, “Which factors have got more weightage than others?”.

#### **Critical Success Factors from literature review:**

Based on the repetition in literature review, following factors were taken up for the study:

#### **Support from top management during the project:**

In most of the literature reviews, this CSF is at the top of the list. Hyvräri suggested that support from upper management plays an important role in the success of the project [11]. Also, Kharub & Sharma, 2015; Zala et al., 2020 and *CHAOS MANIFESTO*, 2012 have rated this factor as top factor for project success.

Rezaiea and others agree that support from top management is a critical element for successful projects. It is possible to obtain resources easily and avoid conflicts when top management is supportive (Rezaiea et al., 2009).

It takes restless efforts from the top management to ensure that a project is a success. Romano and Vinelli, 2001; Grover et al., 2006 are very clear that no project is success till top management involvement.

Similarly, many more researchers like Jitpaiboon and Rao, 2007; Arumugam et al., 2008; Co et al., 1998; Sony & Naik, 2019; Almajed & Mayhew, 2013; Venczel et al., 2021; Teo & Ang, 1999 agreed that top management involvement is positively linked with high-quality performance in the organisation. Spalek mentions top management support influences project success by 84%. [24]

Rodney Turner et al., have clearly stated that “support from top management” is significant for project success [5]

Top management deciphers the policy into goals, objectives, and strategies, and projects a shared vision of the future which in turn contributes to project success. Hence, this factor is number one in their list [25]

Studies by Venczel et. al, confirm that top management support influences project success by 84%. [23] According to Chow and Cao, in the organisational dimension, “top management support” is critical to project success (Chow and Cao, 2008).

### **The Project Quality (approved standards) for the project:**

According to the model given by Nara et al., the quality of the project promotes project success [10]. Wateridge mentioned in his study that the project is profitable when it meets quality thresholds [2].

Jonker suggests that quality improvement tools in project management are effective and lead to project success (Jonker, 2000)

Mouelhi and Ghazali mention that maintaining project quality is a determinant for project success and growth [28] For improvement in project success, quality is a factor that has played a significant role. It is interesting to note that case studies provided by Sony and Naik are united by “quality” as a competitive factor. [22]

The other researchers that support this factor as critical factor for project success are:

Cooke-Davies, 2002; de Wit, 1998; Ika, 2009; Jugdev & Muller, 2005; Jugdev et al., 2001; Tonge et al., 1998; The Enterprise Initiative, 1990; Tukul & Rom, 2001; Sinclair and Zairi, 2001; Riyad Eid, 2009; Daugherty et al., 1995; Fawcett et al., 2007; Bose et al., 2008; Wiengarten et al., 2010; Srinivas et al., 2019.

### **The project team:**

Nara mentions in the list of CSFs that team coordination is important for the project to be successful [10]. Also, team involvement is a must for a project to succeed (Srinivas et al., 2019); (Almajed & Mayhew, 2013). According to Zhang and He, team involvement in the project has a positive effect on the performance and level of success [18]. Project is made up of people and the success of the project depends on their shoulders [22]

According to Pacagnella et al., when the team is strongly gelled and highly motivated, there is a high likelihood that the project will be a success [26]

Wang, Lin, and Huang have clearly stated that when teams are participative in the project, it has a positive effect on the project and increases the chances of the project success [27]

According to Kharub and Sharma, when the team is participative, effective implementation of policies is possible leading to high chances of project success. In the people dimension, the team with competence and expertise contributes to project success [16].

Other researchers which support this factor for project success are: Matta & Ashkenas, 2003; Turner, 1993; Atkinson, 1999; Cooke-Davies, 2002; de Wit, 1998; Ika, 2009; Jugdev & Muller, 2005; Jugdev et al., 2001; Belout & Gauvreau, 2004; Hawk, 2006; Dov Dvir, Tzvi Raz and Aaron J. Shenhar, 2002; Qing Cao and James J. Hoffman, 2011; Bourne, 2007.

### **The project completion time:**

Timely completion is one of the elements of the oldest model of project success which is iron triangle as discussed in the earlier section. Haron suggested that timely delivery of the project is among the top five factors contributing to project success. (Haron et al. 2017)

Some initiatives lead to project performance improvement, the major factor that plays a role here is the timely completion of the project. [22]

Timely completion of the project increases the competitive edge in the market and increases the chances of project success [25]

The other researchers that support this factor for project success are: Matta & Ashkenas, 2003; Turner, 1993; Atkinson, 1999; Cooke-Davies, 2002; de Wit, 1998; Ika, 2009; Jugdev & Muller, 2005; Jugdev et al., 2001; Belout & Gauvreau, 2004; Hawk, 2006; Dvir, Raz, and Shenhar 2003; Qing Cao, James J. Hoffman, 2011; Bourne, 2007.

### **The project budget:**

Wateridge mentioned that the project is profitable when it is within budget. Turner, 1999 argues that a successful project should be within the budget [2]. Pinto and Slevin, have also defined a successful project in terms of budget [8]. Haron suggested that project cost/ budget is among the top 5 factors contributing to project success. (Haron et al., 2017)

Project budget is one of the elements of the oldest model of project success that is the iron triangle as discussed in the earlier section.

The other researchers that support this factor for project success are: The Enterprise Initiative, 1990; Baker et al., 1988; Pinto and Slevin, 1988; Hawk, 2006; Dvir, Raz, and Shenhar 2003; Qing Cao, James J. Hoffman, 2011; Bourne, 2007; Loh and Koh, 2003.

### **The Scope of the project:**

When goals/ objectives are set for the projects in the initiation, it avoids unnecessary activities and sources of conflict (Ahmad and Cuenca, 2013). The most important ingredient of the project success is clear goals and objectives. [21] The project goals must be aligned with organisations' strategies [22]

The other researchers that support this factor for project success are: Pinto & Slevin, 1987; H. Takanaka, 1991; Gowan & Mathieu, 1996; Tor Guimaraes & Ketan Paranjape, 2013; Belout & Gauvreau, 2004; Safty, 2012; Sunil Sharma & Anuradha R. Chetiya, 2012; Handfield et al., 2000; Li et al., 2003; Humphreys et al., 2004; Kannan et al., 2010; Srikanta Routroy & Sudeep Kumar Pradhan, 2011; Dvir, Raz, and Shenhar, 2003; Clarke, 1999; Pacagnella et al., 2019; Ahmad and Cuenca, 2013; Guimaraes & Paranjape, 2013; Venczel et al., 2021; White and Fortune, 2002; Nara, 2015.

### **Effective communication between stakeholders:**



The research by Hyvräri indicated that communication was most relevant factor to implement the project successfully [11]. According to Nara et al., precise communication between the stakeholders of the project is the need to deliver a successful project. Also, they suggest that communication is a factor that is relevant in all the stages of the project. They call it a most important critical factor. They found that project success and communication relationship is significant [10]. According to Cervone, maintaining effective communication in a project avoids mistakes in the work, generating better results and hence increasing the probability of success [19].

Maintaining proper communication during the project generates better results and increases the probability of project success [26]

According to Chow and Cao, strong communication among the stakeholders increases the chances of the project being successful (Chow and Cao 2008).

The other researchers that support this factor for project success are: Gowan & Mathieu, 1996; Yoder, 1990; Pinto and Slevin, 1987; Takanaka, 1991; Guimaraes & Paranjape, 2013; Pinto & Dominguez, 2012; Fox et al., 2009; Belout & Gauvreau, 2004; Safty, 2012; Clarke, 1999; Pacagnella et al., 2019; Fortune and White, 2006; Fraz et al., 2016; Thi & Swierczek, 2010; Fotopoulos and Psomas, 2010; Mahmud and Hilmi, 2014; Kumar et al., 2011; Srinivas et al., 2019; Almajed & Mayhew, 2013.

### **Clear objectives of the project:**

According to Nara et al., understanding the technical details of the project is another important CSF [10].

The level of project success depends on sustaining/understanding the technical details (product and process design) of the project right at the outset [8]. This is supported by Brah et al., 2000; Zu et al., 2008; Kumar et al., 2011; Almajed & Mayhew, 2013.

According to Ahmad and Cuenca, “clear objectives of the project” is the fundamental guiding factor for the team. It avoids conflicts and unnecessary conflicts (Ahmad and Cuenca, 2013).

Turner et al., have clearly stated that “clear objectives” are important for project success [5]. An empirical study by Nara et al., suggests that having clear goals / objectives for the project contributes to the project’s success [10].

The other researchers that support this factor for project success are: Pinto and Slevin, 1987; Takanaka, 1991; Gowan & Mathieu, 1996; Tor Guimaraes and Ketan Paranjape, 2013; Belout & Gauvreau, 2004; Safty, 2012; Sharma & Chetiya, 2012; Handfield et al., 2000; Li et al., 2003; Humphreys et al., 2004; Kannan et al., 2010; Routroy & Pradhan, 2013; Dov Dvir, Tzvi Raz, Aaron J. Shenhar, 2002; Clarke, 1999; Pacagnella et al., 2019; Ahmad and Cuenca, 2013; Guimaraes & Paranjape, 2013.

### **Customer Involvement:**

In the list of CSFs from Hyvräri, “coordination with the client” is given importance [11]. Deteriorated relationship with the customer is a major cause for the poor performance of the project. (Brah et al. 2000; Kanji and Wallace 2000; Kumar et al., 2011). Customer participation has a major effect on project success. [21]

According to the model given by Nara and others, customer involvement promotes project success [10]. According to Haron, Customer engagement is among the top 5 factors for project success. (Haron et al., 2017). Customer involvement is ranked third in the list of CSFs. [25]

For the project to be successful, Chow and Cao suggest that strong commitment from customers and customer presence is required (Chow and Cao, 2008).

The other researchers that support this factor for project success are: Atkinson, 1999; Baccarini, 1999; Bannerman, 2008; de Wit, 1988; Jugdev & Müller, 2005; Wateridge,

1998; Jiang, Chen, & Klein, 2002; Lim & Mohamed, 1999; McLeod et al., 2012; Yoder, 1990; Tor Guimaraes & Ketan Paranjape, 2013; Ahmed Fraz et al., 2016; Zala et al., 2020.

Based on the discussion of literature review, following factors were selected for this study:

1. Support from top management during the project.
2. The Project Quality (approved standards) for the project
3. The project teams
4. The project completion time.
5. The project budgets
6. The Scope (goals of the project)
7. Effective communication between stakeholders
8. Technical details of the project.
9. External stakeholder (e.g., customers) played an important role in the success of the project.

### Research objective:

1. To narrow down and identify most important CSFs impacting the project success.
2. To carry out the analysis and find the impact of each factor on the project success.
3. To provide practical guideline to the project managers for successful project completion.

### Research design and Data analysis:

This study was carried out through a questionnaire survey. A well-structured questionnaire consisting of two parts was designed for the study. The questionnaire was designed based on the factors recognized from the literature review. The first part covers the demographic profile of project managers and the second part includes items related to project management related practices. All relevant data was collected between January 2020 and April 2020. This study also involves a statistical analysis for grouping the variables and assessing the reliability of the factors. The respondents are from the MSME Manufacturing. According to the Government policies, MSME can be classified as per the Table 2.

**Table 2. MSME Definition Source**

**<https://msme.gov.in/know-about-msme>, 1 July 2020**

	Investment	Turnover
	Less than 1 cr.	Less than 5 cr.
<b>MICRO</b>	Less than 10 cr.	Less than 50 cr.
<b>MEDIUM</b>	Less than 20 cr.	Less than 100 cr.

Primary data was collected from the project managers and business owners in and around Pune, India. The questionnaire was distributed to a total of 110 participants. As per the MCCIA -Maharatta Chamber of Commerce, Industries and Agriculture (MCCIA) which is a database of Industries, MSME data was selected for this study. Based on this data and literature review, the sample size of 110 was determined for this study (MCCIA, 2018). MCCIA has 1000+ companies' data from manufacturing sector. Hence, this sample size is representative figure of MSME manufacturing sector.

The participants marked each variable on Likert Scale of 1 to 5, where:

1 - Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 - Strongly Agree

Collected data is homogeneous as it is collected from project managers.

## Results and discussion:

The Cronbach's Alpha defines internal consistency. Nunnally argued that in theoretical studies, even modest reliabilities of 0.60 or 0.50 may be acceptable [30] Generally, the agreed lower limit for Cronbach's alpha value is 0.70, it may decrease to 0.60 and still be acceptable, especially in exploratory studies and in research in the Social Sciences (Joseph F. Hair et al., 2010).

**Table 3. Cronbach's Alpha**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.829	.831	9

In this study, Cronbach's Alpha is 0.829 which is the accepted value. (Refer Table 3)

Factor analysis is used to create a statistical model which predictive in nature. Factor analysis focuses on the formation of factors. It was done to get the loading of variables. It aims at grouping variables based on a high correlation between them. Also, there can be a possibility of a lower correlation between variables. As the model is based on the correlation between variables, KMO & Bartlett's Test of Sphericity was used to measure the sampling adequacy for each variable in the model and for the complete model. This test acts as a practical measure of the suitability of the data available for factor analysis; The KMO test returns a value on a scale of 0 to 1. (Refer Table 4)

**Table 4. KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.840
Bartlett's Test of Sphericity	Approx. Chi-Square	350.590
	df	36
	Sig.	.000

Also, this test relates to the significance of the study and shows the validity and suitability of the collected responses. If the Sphericity is less than 0.05, Factor Analysis can be used (Bartlett, 1950).

The table 4 shows that sampling adequacy is 0.840. This result acts as a suggestion that the correlations between the available data are sufficient.

**Table 5. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.368 <sup>a</sup>	.136	.060	.788

a. Predictors: (Constant), Customer participation, Scope, Top management support, Clear objectives of the project, Adequate project team capability (Availability of skilled personnel), Completion of project within estimated cost, Effective communication management, Completion of project within estimated time, Completion of project with quality

Referring to the Table 5, the Adjusted R *square* value of 0.06 indicates that 6% of the variation in 'project success' can be explained by the model containing the nine factors.

**Table 6. Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.030	.985		2.061	.042
	Scope	.150	.112	.138	1.344	.182
	Top management support	.018	.127	.014	.139	.890
	Adequate project team capability (Availability of skilled personnel)	-.132	.120	-.122	-1.097	.275
	Clear objectives of the project	.238	.134	.196	1.773	.079
	Completion of project within estimated cost	.139	.129	.161	1.076	.285
	Completion of project with quality	.168	.144	.171	1.173	.244
	Completion of project within estimated time	-.196	.131	-.212	-1.497	.137
	Effective communication management	-.109	.173	-.077	-.632	.529
	Customer participation	.122	.207	.068	.589	.557

a. Dependent Variable: project success

With reference to Table 6:

Project success (y)= 2.03 + 0.15 (scope) + 0.18 (top management) – 0.13 (project team) + 0.23 (clear objectives) + 0.139 (cost) + 0.168 (quality) – 0.19 (time) – 0.109 (communication) + 0.12 (customer)

1. The above regression equation shows that if the scope factor is increased by 1 unit, project success will go up by 0.15 controlling the effect of other factors.
2. If top management is increased by 1 unit, project success will go up by 0.18 controlling for the effect of other factors.
3. If the project team is increased by 1 unit, project success will go up by 0.13 controlling for the effect of other factors.
4. If “clear objectives of the project” factor is increased by 1 unit, project success will go up by 0.23 controlling for the effect of other factors.
5. If cost factor is increased by 1 unit, project success will go up by 0.139 controlling for the effect of other factors.
6. If the quality factor is increased by 1 unit, project success will go up by 0.168 controlling for the effect of other factors.
7. If “timely completion of the project” factor is increased by 1 unit, project success will go up by 0.19 controlling for the effect of other factors.
8. If “communication between the stakeholders” factor is increased by 1 unit, project success will go up by 0.109 controlling for the effect of other factors.
9. If “customer involvement” factor is increased by 1 unit, project success will go up by 0.12 controlling for the effect of other factors.

Ranking of CSFs:

**Table 7. Ranking**

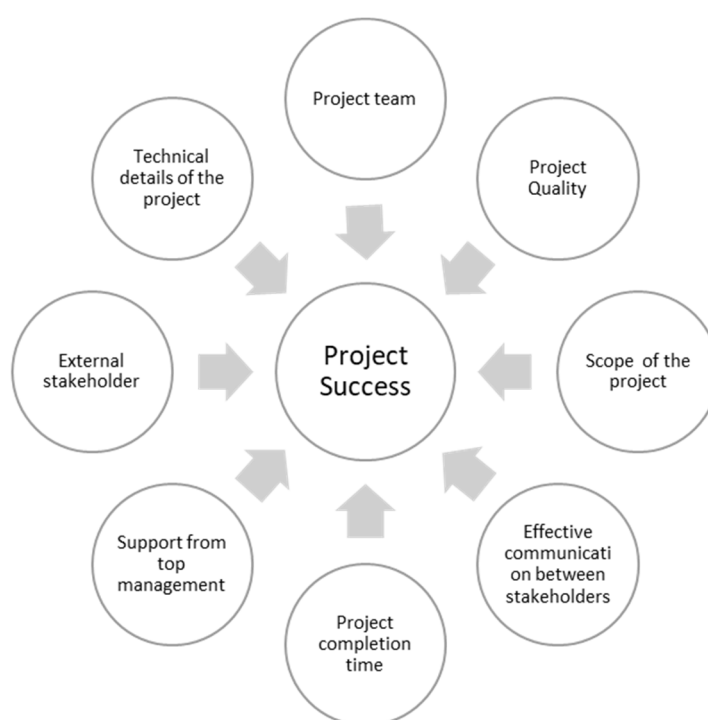
Source Variable
Scope <sup>b</sup>

Top management support <sup>b</sup>
Adequate project team capability Availability of skilled personnel <sup>b</sup>
Clear objectives of the project <sup>b</sup>
Completion of project within estimated cost <sup>b</sup>
Completion of project with quality <sup>b</sup>
Completion of project within estimated time <sup>b</sup>
Effective communication management <sup>b</sup>
Customer participation <sup>b</sup>

Based on the above table (Table 7), the top three CSFs were “scope of the project”, “support from top management” and “team capability”.

### Proposed framework:

Figure 3 is the proposed framework by the authors. This framework will provide project managers with a roadmap for their projects and pave the way towards project success. It would be valuable to have a method of making a project successful. This study provides a structure to follow for the project managers.



**Figure 3. Proposed Framework**

## Research limitation and future scope of study

In order to design a generic model for Project Success Factors, more fields can be explored and assessed. The sample is not comprehensive in the context of any other industry.

## Conclusion:

MSME Manufacturing industries are attempting to find methods and approaches which will increase their chances of project success. This paper has attempted to give a framework to project managers based on CSFs from the project management perspective. Understanding these CSFs will help project managers create a roadmap that leads to project success. The primary objective of this paper is to find the CSFs and their impact on project success to uncover their underlying interrelationships. Based on data analysis, the top CSFs were “scope of the project”, “support from top management” and “team capability”.

Further studies can be done to evaluate more factors that will be beneficial to the projects. The factors can be studied more to fit other domains.

Lastly, we believe that the framework provided here would be of value to the project managers of the manufacturing MSME sector.

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