

Quantitative Validation of the Critical Success Factors, The Case of Excellence Model Implementation in Public Sector "Egypt Government Excellence Award"

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هيكلية جائزة مصر للتميز الحكومي ودورها المستجد
في تحديث إطار العمل الحكومي
"دراسة تحقيق إحصائي لعوامل النجاح الرئيسية"

أشرف الصفتي

الأستاذ المساعد في مناهج البحث العلمي والادارة الاستراتيجية جامعة اسلسكا مصر.

أحمد صديق

ماجستير إدارة الأعمال - جامعه اسلسكا مصر.
مسؤول أول التقييم والجودة - جائزة مصر للتميز الحكومي- وزارة التخطيط والتنمية الاقتصادية

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- DOI: 10.21608/ijppe.2022.234345 URL: <http://doi.org/10.21608/ijppe.2022.234345>
- Received: 21/3/2022, Accepted: 1/4/2022
- Citation: Elsafty, Ashraf & Seddek, Ahmed. (2022, April). Quantitative Validation of the Critical Success Factors, The Case of Excellence Model Implementation in Public Sector "Egypt Government Excellence Award". The International Journal of Public Policies in Egypt, 1(2), 12-60.

Abstract

The paper outlines the structure of the Egyptian Government Excellence Award and attempts to examine the role of introducing an excellence framework in the development of work in the public sector to improve public services, and identify and propose solutions for practical problems and challenges of the Excellence Award.

The paper aims to validate the critical success factors (CSFs) proposed by (Elsafy & Seddek, 2022) quantitatively, which influence the success of the excellence model's implementation and adoption in the Egyptian public sector. A quantitative method is adopted in validating the Cfs.

The paper summarized potential CSFs that have been analyzed in previous literature and developed different models with different methodologies according to industry context. The majority of literature has discussed and analyzed CSFs regarding TQM principles, with very little literature having discovered CSF of Excellence Models.

A quantitative approach is used in the paper. The data were gathered using a questionnaire with asked various questions addressing the top five CSFs. and other methods, such as EFA and correlation analysis, were used to do the analysis.

The paper will also validate and construct a model of CSF interactions in order to identify the most successful and feasible relationships that may help to synergize and promote the proper implementation of the excellence model in the Egyptian public sector.

The results have validated the output of (Elsafy & Seddek, 2022) regarding CSF, but it validates only five relations out of 11 relation hypothesized among CSFs.

Keywords: CSF, Excellence, Leadership, EGEA

المستخلص

تهدف هذه الورقة البحثية إلى المناقشة والتعمق في هيكلية جائزة مصر للتميز الحكومي ودورها المستجد في تحديث إطار العمل الحكومي، فضلاً عن دراسة دور تبني نماذج التميز الحديثة في تطوير طبيعة عمل القطاع العام وتحسين الخدمات العامة المقدمة للمواطنين، فضلاً عن تحديد واقتراح حلول للمشاكل والتحديات العملية التي يواجهها القطاع الحكومي من خلال جوائز التميز الوطنية.

هذا وبالإضافة إلى ذلك فإن الورقة تهدف أيضاً إلى التحقق كمياً من عوامل النجاح الرئيسية (CSF) و التي قام بدراستها وتحليلها (Elsafty & Seddek, 2022)، والمؤثرة على كفاءة وفعالية تنفيذ نماذج التميز الدولية في القطاع الحكومي المصري وذلك عن طريق استخدام الأساليب الإحصائية المعتمدة.

هذا وقد استعرضت الورقة عوامل النجاح الرئيسية المحتملة (CSF) التي تم ذكرها وتحليلها في الأدبيات السابقة والتي احتوت على نماذج مختلفة بأطر تحليلية مختلفة ومتنوعة بناءً على منظومة العمل التي تم عليها الدراسة، حيث توصلت الورقة إلى أن معظم الأدبيات السابقة قد تناولت مناقشة وتأسيس عوامل النجاح الرئيسية (CSF) فيما يتعلق بنظم إدارة الجودة الشاملة فقط، وتبني عدد قليل جداً من الأدبيات مناقشة وبناء نماذج لعوامل النجاح الرئيسية (CSF) فيما يخص نماذج التميز الدولية.

وقد اعتمدت الورقة على المنهجية الكمية الإحصائية. حيث يتم جمع البيانات باستخدام استبيان يحتوي على مجموعة من الأسئلة الخاصة حول عوامل النجاح الرئيسية الخمسة المقترحة (Elsafty & Seddek, 2022) ومن ثم تم استخدام بعض الأساليب الإحصائية مثل (EFA) (Correlation Analysis).

وبالإضافة إلى ذلك فإن الورقة أيضاً قامت بدراسة وبناء نموذج للعلاقات البيئية بين عوامل النجاح الرئيسية وبعضها البعض والمصممة من قبل (Elsafty & Seddek, 2022) وذلك لتوضيح أطر العلاقات البيئية بين عوامل النجاح الرئيسية (CSF) من حيث مدى ترابطها وتأثيرها على بعضها البعض أو على فعالية تطبيق نماذج التميز بالقطاع الحكومي.

هذا وقد أثبتت النتائج الإحصائية المستخرجة صلاحية النموذج المتبني من قبل (Elsafty & Seddek, 2022) وذلك فيما يتعلق بأهم عوامل النجاح الرئيسية الخمسة وهم القيادة، رأس المال البشري، الثقافة، نموذج التميز، نظام إدارة الأداء وأيضاً أثبتت النتائج الإحصائية صلاحية عدد 5 افتراضات للعلاقات البيئية بين عوامل النجاح الرئيسية (CSF) من إجمالي 15 علاقة مفترضة سابقاً.

الكلمات الدالة: عوامل النجاح الرئيسية، التميز، القيادة، جائزة مصر للتميز الحكومي

1. Introduction

To address recent developments, changes and advancements in the external environment, particularly in public sector performance, the Ministry of Planning and Economic Development took the initiative in 2018 to create a national award for organizational excellence performance tailored to government entities.

The award's main goal is to promote competitiveness and excellence among public sector employees and entities, in addition to honoring the outstanding performer morally and financially, by combining the values of giving, belonging, and excellence, and motivating everyone to raise performance levels and adhere to quality and excellence standards, (EGEA, 2019).

The government excellence model was developed with internationally recognized criteria as the cornerstone for performance evaluation, and it is made up of three main pillars:

1. Vision Achievement
2. Innovation
3. Enablers

The research used the Nine Elements Model/ framework by Elsafty (2018, 2019, 2020, 2021) to analyze the context. The framework has been used in several research papers (Elsafty, Elsayed, & Shaaban, 2020; Elsafty & AlNawaly, 2020; Elsafty & Ragheb, 2020/2021; Elsafty & Abadir & Sharawy, 2020; Elsafty, A., Elbouseery, I., & Shaarawy, A., 2020; Elsafty, A., & Elzeftawy, A., 2021; Elsafty, A., & Elshahed, M., 2021; Elsafty, A., & Osman, M., 2021). According to (Elsafty, 2018) who proposes the 9-element model for analyzing and defining the organizational context as shown in figure 2, the model is deployed to analyze and understand the EGEA context.



Figure 1 EGEA Excellence Model (2019)

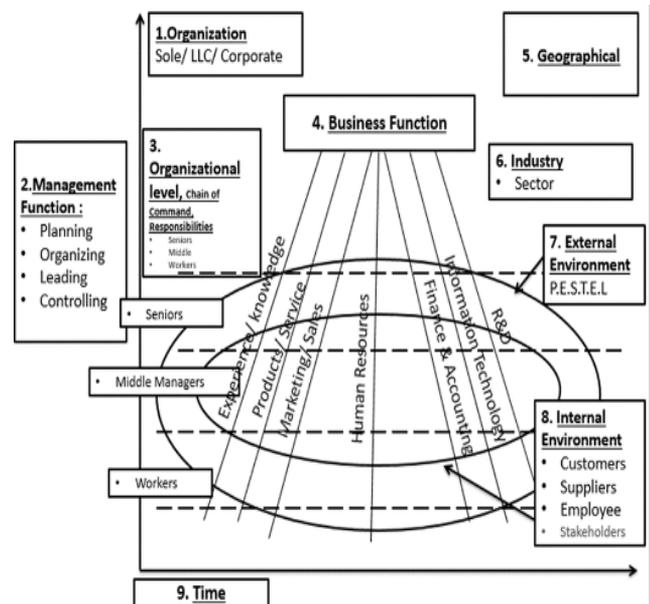


Figure 2 Business Anatomy: The 9 Elements Model Proposed by Elsafty (2018)

1.1 Organization

The Memorandum of Understanding (Memo of Understanding, 2018) signed by Egypt's Ministry of Planning and Economic Development and the Prime Minister's Office of the United Arab Emirates, as a procedure for partnership in the area of government performance development.

1.2 Management Function

The principal functions of the EGEA management team, according to (EGEA QMS, 2021), include the following main processes:

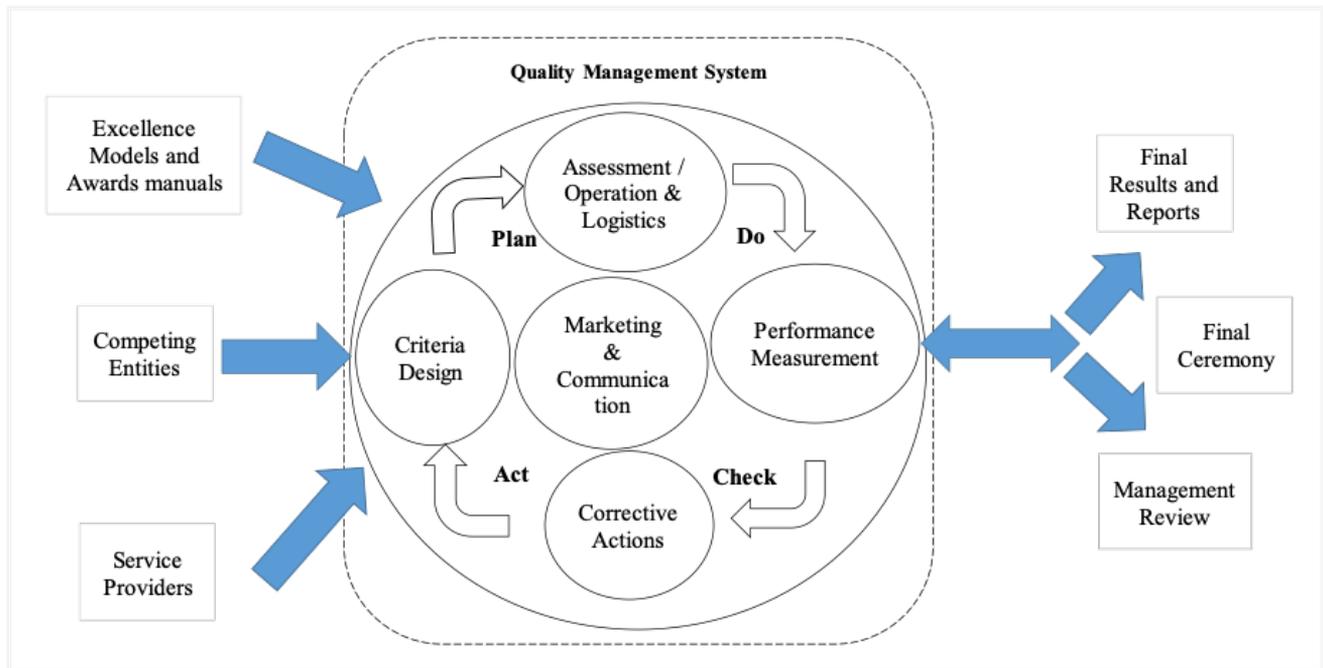


Figure 3 Interaction between Processes: EGEA-QMS (2021)

The Egyptian Cabinet agreed that participation in the chosen governmental entity categories is mandatory (Ministerial Decree, 2019). As a result, the EGEA team has devised the following award categories, each of which is relative to a specific category sorts of organizations.



Award	Description	Entities Category	Assessment Criteria	Design and Development of Criteria	References
Leading Entity	This award is given to a government institution.	Local government units Educational institution (Universities)	EGEA Excellence Model Government Excellence Manual, 2018)	EGEA Excellence (Egypt EGEA Team	SKGEP and GEM
Leading Entity in service provision	This award is given to outstanding public service organizations.	Post offices. Notary Public offices. Health offices. Food subsidy offices. Citizen service enters. Social rehabilitation offices for people with special needs.	EGEA public service Excellence Model (EGEA public service excellence model, 2019)	EGEA Team	Global seven star ranking system for services
Website award in government service provision	All interactive government websites have been subscribed to.	Any official government websites with (.gov.eg), (.edu.eg) or (.eg) domains	EGEA websites Excellence Model (Website Quality & Excellence manual, 2019)	EGEA team	Emirates website quality model
Organizational creativity and innovation Award	The award is given to an institution's creative/innovative ideas or efforts that have already been implemented.	Any institution of the government	EGEA innovation and creativity Excellence Model (Creativity and Innovation manual, 2019)	EGEA team	Emirates innovation and creativity model
Individuals Awards	The award is given to the following: Senior management. Middle management. Employee Tem work	Only for government employees	EGEA leadership Excellence Model (Leadership/ Individual/Team work manual, 2019)	EGEA team and SKGEP team	Emirates leadership excellence quality

Table 1. EGEA Award Categories and nominated Entities (2021)

1.3 Business Function

The EGEA team has established a documented management system (EGEA QMS, 2021) to record and enhance all aspects of business function systematically in accordance with internationally recognized standards, ISO 9001:2008. So far, two cycles of assessments have been conducted, with the information and outputs from the two cycles presented in the table below. The EGEA of knowledge management system is carried out in a variety of ways between EGEA and its stakeholders, using various methods of knowledge transfer.

The Ministry of Planning and Economic Development's Human Resources Department oversees all human resource operations and activities, with its media and communication unit responsible for public relations and advertising. All finance and accounting tasks and operations are overseen by the Finance

Department, with budget and contract coordination by EGEA's operation and logistics department. The award had fully electronically transformed from manual submission and assessment to fully automated process through a tailored design platform for submission, assessment, jury, and final reports to all awards categories and participating entities. EGEA's Quality and Assessment Department is fully responsible for all award criteria updates and design, having developed the following manuals for each award category.

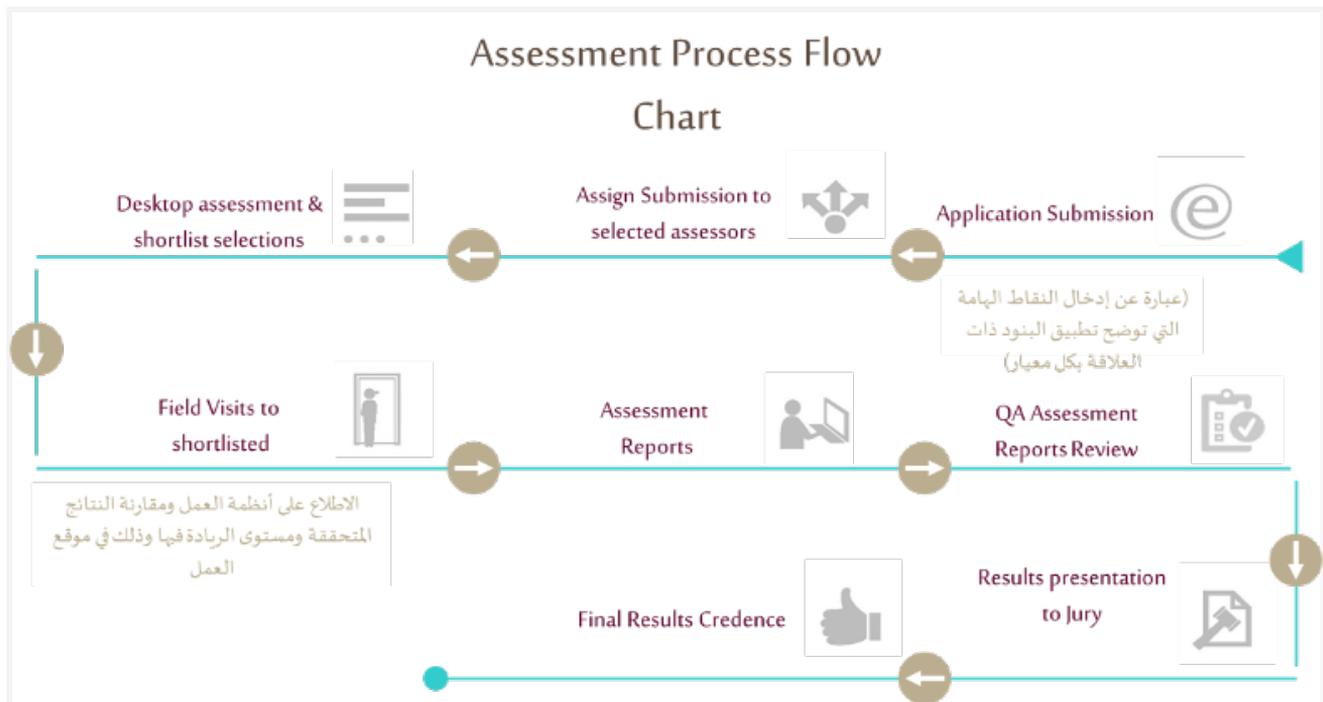


Figure 5 Assessment Process Flowchart (2019)

Award Category	Entity Category	2019 Round Submissions No.	2020 Round Submissions No.
Leading Entity	Universities	290	448
	Centers	141	162
	Cities	31	48
	Villages	15	20
	Districts	64	89
Leading Entity in service provision	Post offices	226	610
	Notary Public offices	64	91
	Citizen service enters	158	160
	Social rehabilitation offices for people with special needs	19	232
	Health offices	NP	310
	Food subsidy offices	NP	50
Website award in government service provision	Any	118	100
Organizational creativity and innovation Award	Any	229	122
Individuals Awards	Sector Head	39	30
	General Directorates	99	66
	General Manager	333	152
	Department Manager	274	126
	Employee	NP	161
	Teamwork	NP	93
Assessment Statistics	Quality Assurance Team	13	20
	Team Leaders Team	9	12
	Participated Assessors	79	104
	Nominated Assessors	101	136
	Total Assessment Hours	46,629 hr.	89,460 hr.

Table 2. EGEA Summary Figures (2021)

1.4 Geography

The award's long-term goal is to cover all public sectors, including 33 ministries, 63 economic authorities, 107 service authorities, 27 governorates, and 27 universities (Masrawy, 2018). EGEA only applies to Egyptian government institutions in Egypt, regardless of their size or nature, and it is confined to the categories listed above, unless new categories are established.

1.5. Industry

EGEA only applies to all government institutions in Egypt, regardless of size or nature.

1.6. External Environment

1.6.1 Political

Because excellence is regarded as a long-term development goal, it cannot be realized in Egypt without political stability and support.

1.6.2 Economic

Because EGEA is overseen by the Ministry of Planning and Economic Development, it has a slight advantage in terms of economic sustainability due to direct contact with high-level commands that facilitate any financial support for the award.

1.6.3 Social

EGEA has published a competency manual for assessor selection and launched a capacity building program for Egyptian assessors, as part of its efforts to increase the pool of selection for this year's awards.

1.6.4 Technological

EGEA has taken the lead in this area, and the award has worked from the beginning to implement and integrate technology into all of its activities, such as an assessment platform and a shared point /cloud for internal processes. Furthermore, EGEA has complete access to the most recent benchmarking initiatives (MOU, 2018).

1.6.5 Ecological

Due to COVID-19 pandemic, EGEA's final ceremony was rescheduled, as was the entire assessment plan. COVID-19 pandemic had a very positive impact on EGEA, because the implementation of technology was widely accepted, but it also caused the ceremony to be postponed.

1.6.6 Legal

In terms of contracting and outsourcing, EGEA is required to follow all public administration legislation, including Law No. 182-2018 for the management of purchasing and contracting of public institutions (Law 182 for the management of purchasing and contracting of public institutions, 2018), as well as any programs or recommendations from the Ministry of Planning and Economic Development or the Egyptian Cabinet.

1.7 Internal Environment

1.7.1 Customer

Government entities are considered the primary customers, receiving the majority of EGEA's service output, which includes training, awareness, reports, and winner recognition.

1.7.2 Supplier

To improve service delivery outcomes for EGEA consumers, EGEA has contracted, with a variety of service providers. Service providers present services for website evaluation, individual award evaluation, assessment platform evaluation, and mystery shopper evaluation to compare real service to target service for service provision award.

1.7.3 Employees

Employees are a combination of government and contract workers, resulting in a broad variety of experience and understanding regarding excellence and government work procedures.

1.8 Stakeholder analysis

Following each assessment cycle, the assessment teams should prepare a lesson learned report (EGEA Lesson Learnt Report, 2019) that is provided to the EGEA management team, which comprises assessors, team leaders and quality assurance. One of the proposals from round one, for example, is to change the criterion for public service awards, which is immediately applied in the second round (EGEA public service excellence model, 2019).

An interview was held with the Director of Quality and Evaluation (M. Mohamady, Personal Communication, August 23, 2021) about his personal opinion on the primary CSFs that define excellence implementation in public sectors. He proclaimed the following CSFs: [1] Leadership, [2] Human assets, [3] Reliable data, [4] Culture, [5] Excellence model, [6] Digital infrastructure, [7] Governance framework, [8] Performance metrics, [9] Trust, and [10] Partnership.

According to (Elsafty & Seddek, 2022), the top five CSFs that impact proper implementation of the excellence model in Egypt's public sector are leadership, human assets, culture, the excellence model, and the performance management system.

1.9 Time

EGEA is held on a yearly basis, with two assessment rounds deployed thus far in 2019-2020, each round covering all activities such as training, evaluation and ceremony.

2. Literature Review

2.1 Excellence and National Quality Awards Overview

The primary goal of government excellence awards is to rate competing entities based on how much they excel in performance against particular criteria, so that the difference between two exceptional organizations can be assessed and defined objectively (Ahrens, 2013).

EFQM is a well-known and frequently utilized excellence model in both the commercial and public sectors throughout the world; however, the model was mainly created by and for the private sector and has been widely embraced by the public sector as well (Ahrens, 2013). Nonetheless, despite widespread adoption, there are various concerns that the model is not effectively configuring with the nature of public sector work in terms of political issues, legislation, governance, and "non-financial performance measurement" (Ahrens, 2013, p.579). As a result, EGEA has opted to embrace the 4G excellence model, which was established by the Emirati government after many years of applying the EFQM excellence model in the public sector.

The main advantage of the 4G excellence model is that it suits government work types by encouraging the public sector to develop innovative solutions within the boundaries of the Law in order to enhance and customize public service. The model also motivates entities to develop benchmark tools to standardize and modernize their scope of work and service provided to public citizens (Ahrens, 2013).

According to Lasrado and Uzbeck (2017), national quality awards implemented by governments throughout the globe have increased capacity for performance improvement in the public sector and have significantly improved overall country performance and competitive indices above others

S.No.	Year	Country	Award	Reference
1	2004	Sweden	Swedish Quality Award	Eriksson (2004)
2	2005	Greece	EFQM	Vouzas and Gotzamani (2005)
3	2007	Turkey	EFQM model	Tutuncu and Kucukusta (2007)
4	2008	Jordan	Jordan quality award	Rawabdeh (2008)
5	2008	Kenya	National Quality Award	Marwa and Zairi (2008)
6	2008	Australia	Australian Quality Award	Grigg and Mann (2008)
7	2009	Fiji	National Quality Award	Djerdjouri (2004)
8	2009	Brazil	Brazilian Quality Award	Cauchick Miguel and Campos (2013)
9	2010	Spain	EFQM Model	Santos-Vijande and Alvarez-Gonzalez (2007)
10	2010	China	China Quality Award	Yong Xiang <i>et al.</i> (2010)
11	2011	Slovenia	Slovenian Business Excellence Prize	Pipan <i>et al.</i> (2011)
12	2011	New Zealand	New Zealand Business Excellence Award	Angell and Corbett (2009)
13	2013	Taiwan	Taiwan National Quality Award	Lin <i>et al.</i> (2013)

Table II.
NQA studies

Figure 6 NQA (Lasrado and Uzbeck, 2017)

2.2. Critical Success Factors in Literature

2.2.1. Critical Success Factors in Empirical and Conceptual Papers

Aquilani, Silverstri, and Ruggieri (2017) attempted to understand all CSFs mentioned in each document from peer-reviewed Articles from the Ebscohost, JSTOR, and Springer Link databases, and provided an analysis of TQM's CSFs that defined three types of papers "Identification Described Papers", "Implementation Papers", "Impact on Performance Papers" (p.184)..

CSFs in our study (2016)	Total number of occurrences (total 103)	CSFs in Sila and Ebrahimpour (2002)	Total number of occurrences (total 76)
1. Leadership/top management commitment/role of top management	93	1. Top management commitment and leadership	67
2. Customer focus/satisfaction	70	2. Customer focus	53
3. Training and education	66	3. Information and analysis	53
4. Measurement or metric systems/data information and analysis/quality data and reporting	59	4. Training	50
5. Supplier collaboration/management/ supplier quality (management)	52	5. Supplier management	47
6. Process quality management	48	6. Strategic planning	38
7. Continuous improvement	46	7. Employee involvement	32
8. TQM as a strategic issue/planning/role of quality department	40	8. Human resource management	26
9. Employee commitment and attitude/ involvement	39	9. Process management	26
10. Organizational culture/quality culture/ organizational climate/learning	37	10. Teamwork	22

Figure 7 A benchmark of most important CSFs (Aquilani,Silverstri and Ruggieri, 2017)

Thiagarajan and Zairi (1997) identified TQM CSFs through implementation case studies supported by the opinions and concepts of quality gurus and authors: [1] leadership, [2] internal stakeholder management, [3] policy and strategy. We focused on four major CSFs: politics and strategy.

Terziovski, Sohal and Samson (1996) described TQM's CSFs in eight Australian manufacturing and service organizations such as: [1] leadership and quality-based vision, [2] employee participation and union, [3] customer expectations, and the measurement of recognition, identified as [4] strategy.

Sila and Ebrahimpour (2003) empirically verified 76 in different situations in multiple countries despite differences in "cultural, religious, educational levels, information technology, government regulation, and industrialization levels". Understanding and analyzing TQM-CSF (p.237). Some CSFs have been successfully implemented in different countries with different variables. The CSF is shown in Figure 8.

TQM factor	No. of studies in which the factor was extracted	No. of country categories in which the factor is present
Top management commitment and leadership	67	23
Customer focus	53	21
Information and analysis	53	17
Training	50	19
Supplier management	47	17
Strategic planning	38	16
Employee involvement	32	18
Human resource management	26	16
Process management	26	13
Teamwork	22	9
Product and service design	21	11
Process control	21	8
Benchmarking	16	12
Continuous improvement	16	10
Employee empowerment	16	6
Quality assurance	15	12
Social responsibility	10	9
Employee satisfaction	9	6

Figure 8 Most commonly extracted CSF across 67 studies and the 23 country categories (Sila and Ebrahimpour, 2003)

Karuppusami and Gandhinathan (2006) have developed a method to identify and categorize CSFs according to the level of importance to TQM by using statistical reliability and strict validity testing to identify and analyze Pareto, to classify the importance. Finally, 56 CSFs have been extracted from a new document review, with 14 factors considered "not very important" (p.376). According to Pareto analysis, accounting for 80% of the total, and the remaining 42 factors accounted for 20% of the total number of "many" (Karuppusami & Gandhinathan, 2006).

Related important factors are leadership and quality policies, supplier management, customer focus, training, staff relations, design and service products, quality data, roles of the service of quality, human resource management, design and compliance, cross-quality team, analysis and comparative analysis.

Therefore, after considering the concept or availability of experimental paper to explore all CSFs that have been described and initiated in a document (Aquilani et al., 2017), we have concluded that the most basic CSF has been started and theory through different literature. They are main management commitments and leaderships, focus of customers, information and analysis, training and education, supply chain management, strategic planning, participating in employees, human resources, management Procedures, teamwork, staff relationships, design/service of employees.

Critical success factor	Occurrences	Percentage of occurrences	Cumulative percentage of occurrences
1 <i>The role of management leadership and quality policy</i> (top executive support, top management commitment, top management support, top management, committed leadership, visionary leadership, senior executive involvement, supervisory leadership, leadership creativity and quality strategy, management leadership, executive commitment)	29	9.48	9.48
2 <i>Supplier management</i> (supplier co-operation, supplier development, supplier integration, supplier involvement, supplier partnership, supplier performance, supplier quality, supplier quality management, supplier relates with responding entity, supplier relationship, TQM link with suppliers, co-operative supplier relations, vendor quality management, closer to suppliers, relations with the supplier, responding entity relates with supplier)	28	9.15	18.63
3 <i>Process management</i> (processes, process flow management, process improvement, production process, process control, process control and improvement, process design (SQC), flexible manufacturing, advanced manufacturing systems, use of JIT principles, inventory reduction, technology utilization, process quality)	28	9.15	27.78
4 <i>Customer focus</i> (customer focus and satisfaction, customer involvement, customer orientation, customer relates with responding entity, customer relationship, customer satisfaction, customer satisfaction orientation, customer service, customers, TQM link with customers, close customer leadership, closer to customers, relation with the customers, responding entity relates with customer)	23	7.52	35.29
5 <i>Training</i> (quality training, specialized training, personnel training, education, education and training, employee training)	22	7.19	42.48
6 <i>Employee relations</i> (employee participation, employee satisfaction, employee empowerment, employee involvement, employee fulfillment, delegation and empowerment, worker manager, interactions)	22	7.19	49.67
			(continued)

Critical success factor	Occurrences	Percentage of occurrences	Cumulative percentage of occurrences
7 <i>Product = service design</i> (product design, product design process, product design simplicity and producibility, product = service innovation)	17	5.56	55.23
8 <i>Quality data</i> (quality improvement measurement system, quality information, quality information availability, quality information flows, quality information systems, quality information usage measurement, internal quality information usage)	17	5.56	60.78
9 <i>Role of quality department</i> (quality, quality assurance, quality citizenship, quality continuous improvement, quality system improvement)	13	4.25	65.03
10 <i>Human resource management and development</i> (providing assurance to employees, employee selection and development, feedback and employees relations, workforce management, people management, Congenial inter personal Relations)	13	4.25	69.28
11 <i>Design and conformance</i> (design and development of new products, design quality, design quality management, conformance and design, product cost product durability, product improvement, product quality, product reliability, conformance quality)	12	3.92	73.20
12 <i>Cross functional quality teams</i> (communication across the organization, communication of improvement information, cross functional communications to improve quality, use of teams, team working, teamwork structure)	9	2.94	76.14
13 <i>Bench marking</i> (bench marking on quality and service, benchmarking on cost, use of benchmarking)	7	2.29	78.43
14 <i>Information and analysis</i> (information and data management, information technology, information technology for quality)	5	1.63	80.07
15 <i>Critical success factors – useful many</i> (Table III)	61	19.93	100.00

Figure 9 CSFs- Vital Few (Karuppusami and Gandhinathan, 2006)

	Critical success factor	Occurrences	Percentage of occurrences	Cumulative percentage of occurrences
1	<i>Statistical control and feedback</i> (statistical method, SPC, SPC usage)	5	1.63	1.63
2	<i>Quality planning</i> (quality policy, strategic quality planning, strategic quality management)	5	1.63	3.27
3	<i>Strategic planning</i> (vision and plan statement, planning, shared vision)	5	1.63	4.90
4	Continuous improvement	4	1.31	6.21
5	Learning	3	0.98	7.19
6	Knowledge	2	0.65	7.84
7	Work attitudes	2	0.65	8.50
8	Adopting philosophy	1	0.33	8.82
9	Behavioural	1	0.33	9.15
10	Brand image	1	0.33	9.48
11	Co – operation	1	0.33	9.80
12	Company reputation	1	0.33	10.13
13	Compensation	1	0.33	10.46
14	Competitive assessment	1	0.33	10.78
15	Corporate quality culture	1	0.33	11.11
16	Evaluation	1	0.33	11.44
17	External internal management	1	0.33	11.76
18	External quality in-use	1	0.33	12.09
19	Financial results	1	0.33	12.42
20	Impact of increased quality	1	0.33	12.75
21	Impact on society	1	0.33	13.07
22	Internal and external co-operation	1	0.33	13.40
23	Internal support	1	0.33	13.73
24	Maintenance	1	0.33	14.05
25	Measuring product and service	1	0.33	14.38
26	Open organization	1	0.33	14.71
27	Operation procedures	1	0.33	15.03
28	Operational quality planning	1	0.33	15.36
29	Organizational commitment	1	0.33	15.69
30	Participatory orientation	1	0.33	16.01
31	People and customer management	1	0.33	16.34
32	Policy and Strategy	1	0.33	16.67
33	Proactive business orientation	1	0.33	16.99
34	Recognition and reward	1	0.33	17.32
35	Results and recognition	1	0.33	17.65
36	Rewards and SPC	1	0.33	17.97
37	Rewards to employees for quality department	1	0.33	18.30
38	Traditional engineering	1	0.33	18.63
39	Values and ethics	1	0.33	18.95
40	Work culture	1	0.33	19.28
41	Workforce commitment	1	0.33	19.61
42	Zero defects mentality	1	0.33	19.93
	Cumulative occurrences	61		

Figure 10 CSFs- Useful many (Karuppusami and Gandhinathan, 2006)

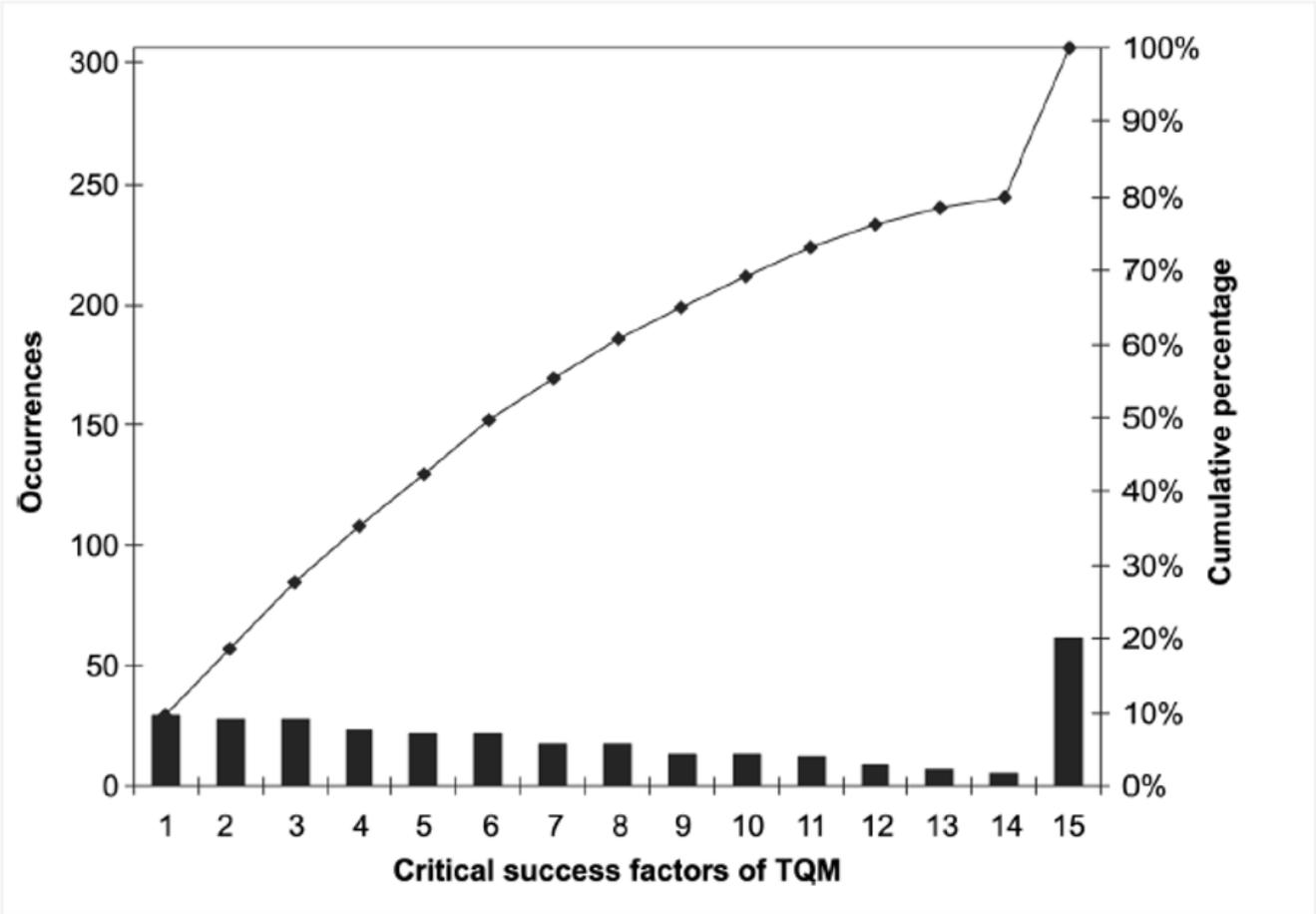


Figure 11 Pareto analysis of CSFs of TQM (Karuppusami and Gandhinathan, 2006)

Critical success factor	Insight
Top management commitment and leadership	“TQM must start at the top, where serious obsession and commitment to quality and leadership need to be demonstrated” even if it’s true that “middle management also has a key role to play in communicating the message” (Oakland, 2011, p. 517)
Customer focus or satisfaction	Some scholars considered customer satisfaction as a CSF or enabler, while others as an outcome or a result of a successful implementation of TQM (Porter and Parker, 1993; Yusof and Aspinwall, 1999). Issac <i>et al.</i> (2004) affirmed that customer satisfaction is the philosophy of TQM
Information and analysis (measurement)	Measuring helps evaluate the quality of processes and products or services, being the most important method to check continuous improvement, monitor processes, analyze, and correct gaps from required standards. Measurement needs data gathering first (Malik <i>et al.</i> , 2012)
Training and education	Training and education are considered the most important aspect of human resource management (HRM); “TQM training” is considered “a key to successful implementation of TQM along the dimensions of cost reduction and profit increase” (Kassicieh and Yourstone, 1998, p. 36). Training needs, employee motivation, improvement in future performance effective evaluation are essential to build a quality-based HR performance evaluation
Supply chain management	Improvements in the quality of products or services require that all major suppliers respect quality specifications of the organization (González-Benito <i>et al.</i> , 2003)
Strategic planning, and role of quality department	Saraph <i>et al.</i> 's (1989) identified “the role of the quality department” among the eight most important factors in quality management
Employee involvement	An important TQM principle is that everyone throughout the organization should be responsible for quality. That is why employees should participate using their skills and abilities in order to improve the processes within their responsibilities (Talib and Rahman, 2010). Obviously, employee commitment and involvement have a huge effect on company performance and depend both on personal characteristics and on management practices, behavior, working environment, organizational climate, etc. (i.e. Talib and Rahman, 2010; Malik <i>et al.</i> , 2012)
Human resource management (HRM)	Wright and McMahan (1992) defined human resource management (HRM) as “the pattern of planned human resource deployments and activities intended to enable the firm to achieve its goals.” Quality management practices, together with the development of managerial and organizational competencies and information systems, support cultural changes able to lead to business transformation (Philip and McKeown, 2004). Indeed, HRM performance appraisal need “to be consistent with the culture and principles that guide the conduct of the organization” to be accepted and positively affect TQM implementation (Soltani <i>et al.</i> , 2003, p. 334)
Process management	A process is a sequence of interdependent activities that consume resources converting inputs into outputs. According to quality gurus (i.e. Deming, Juran, Ishikawa, etc.) activities in an organization should be managed as a process. Its importance as a CSF for TQM arises from its ability to add value to processes, increase quality levels and raise productivity (Bigwood, 1997; Motwani, 2001)
Teamwork	Teamwork, strictly related to employee involvement and commitment, but also to HRM, has often been associated with the goal of a flatter organization. Yusof and Aspinwall (1999) highlighted that Black and Porter (1996) considered this as the third critical factor, but they suggest replacing it with “continuous improvement system” and “education and training”
Employee relations	Employee relations was first cited as the eighth critical factor by Saraph <i>et al.</i> (1989). Nearly ten years later Mohanty and Lakhe (1998) defined employee relations as the “extent of employee involvement in quality problem solving” (p. 516) which can be enhanced by the commitment of top management
Product/service design	In Arumugam and Mojtahedzadeh's (2011) words, product design “increase[s] competitive advantage between organizations” (p. 27) and for single firms. It obviously improves “the product quality” (Arumugam and Mojtahedzadeh, 2011, p. 27) as well as the “internal quality outcomes” (Ahire and Dreyfus, 2000) and it influences firm performance (Arumugam and Mojtahedzadeh, 2011)

2.2.2 Critical Success Factors in Applied Research Papers

AlZawati et al. (2020) reported that 46 Ems CSFs identified their implementation after extensive literature review, ISM and Fuzzy MICMAC were used through Delphi methodology and structured brainstorming with experts in the literature. Using data in different fields, where the 28 most famous factors are selected from the agreed perspectives to suit the research context, the model has been developed in relation to the following figures.

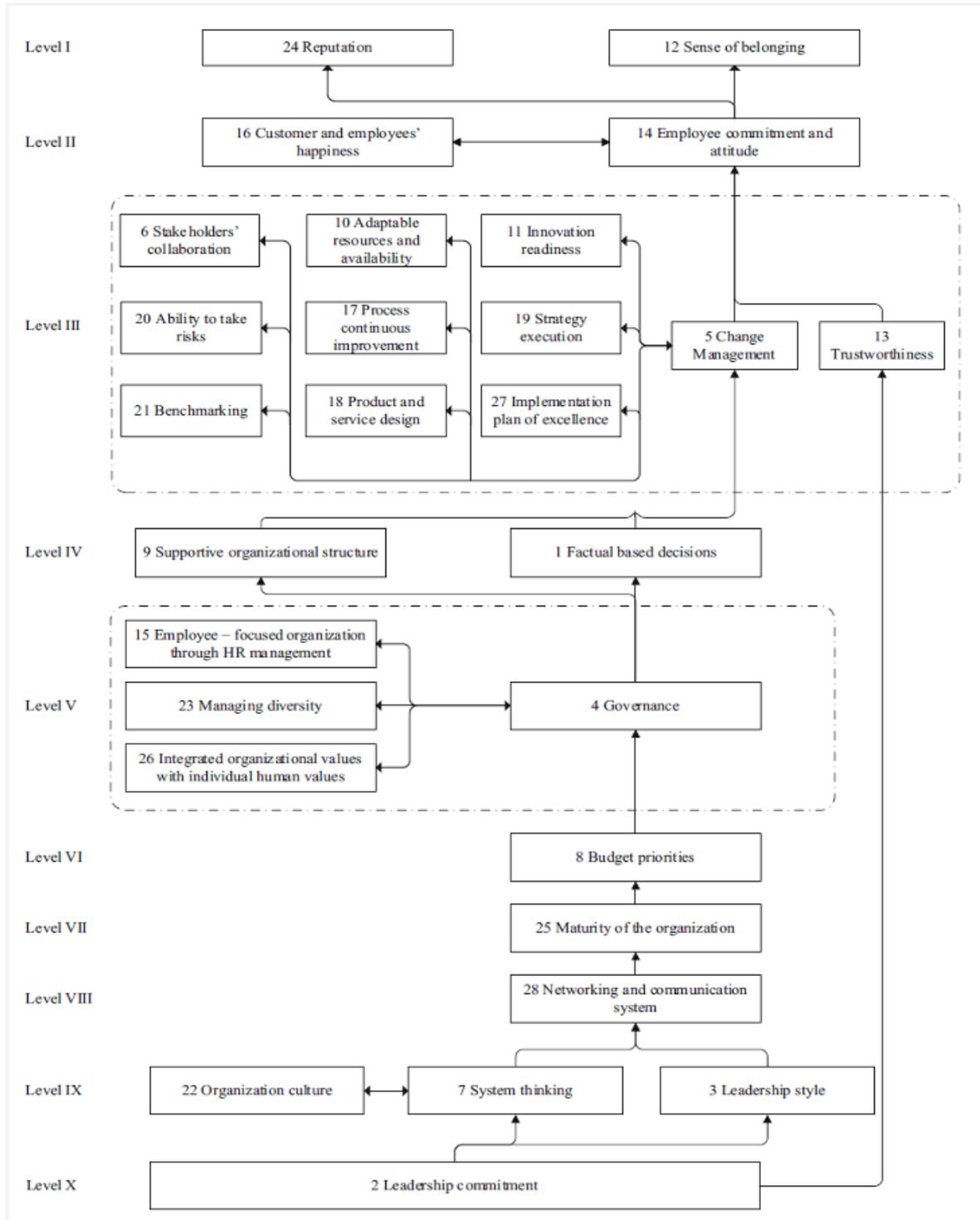


Figure 13 ISM -based Model for CSFs (AlZawati, Bashir & Alsyouf, 2020)

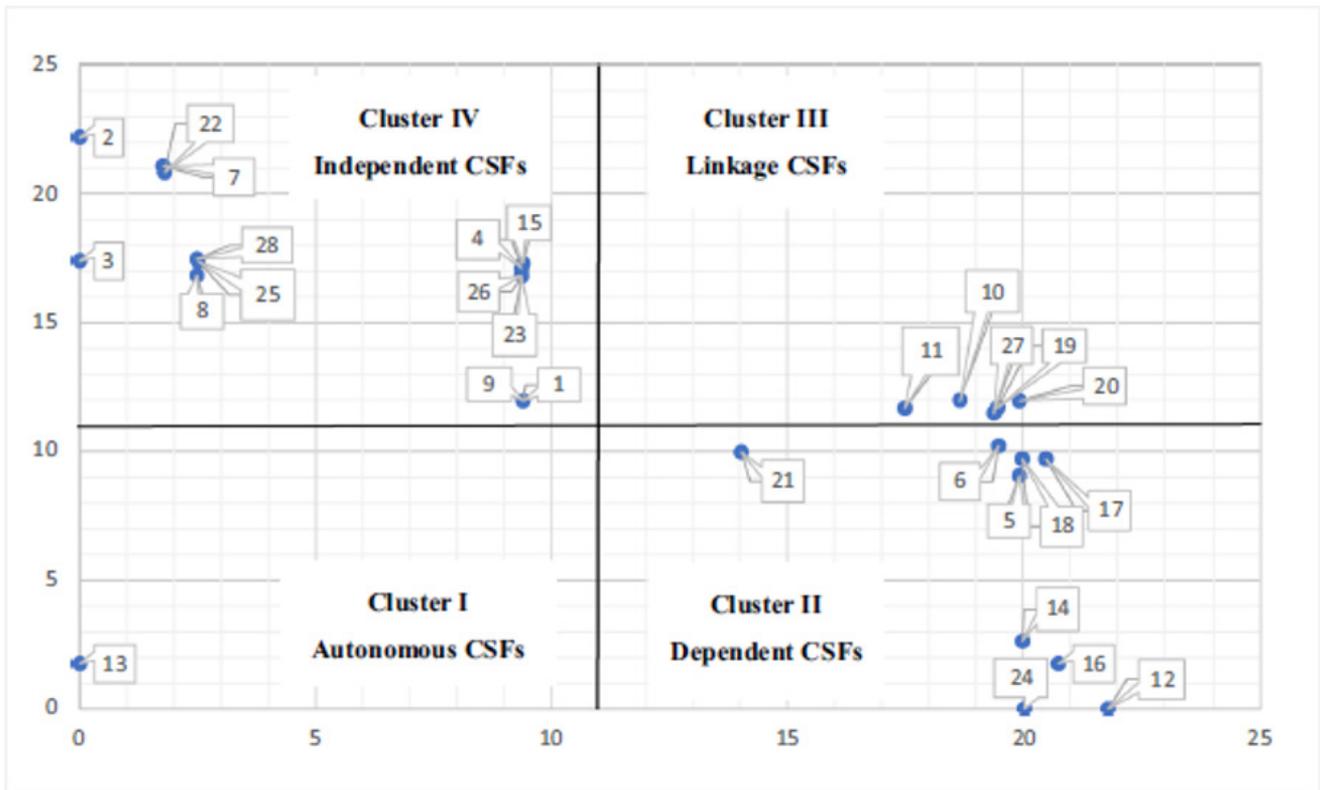


Figure 14 Driving power and dependence power cluster diagram (AlZawati, Bashir & Alsyouf, 2020)

Lasrado and Uzbek (2017) researched award-winning organizations in the UAE, particularly those that have participated in DQA, to identify key practices, best practices, and pathways to excellence. They passed the national award.

The study concludes that the following CSFs have a positive relationship with successful implementation excellence and performance: leadership style, culture of innovation, employee empowerment, commitment of senior management, organizational structure, stakeholder engagement, continual improvement of resource allocation, self-assessment, employee satisfaction, organizational culture, apply integrated management system (ISO standard), Employee reward system, training and awareness raising, employee skills, benchmark, and technological advancement.

Arumugam, Mojtahedzadeh and Malarvizhi (2011) discussed how CSFs influence automotive organization performance through the implementation of TQM philosophy as shown in Figure 16.

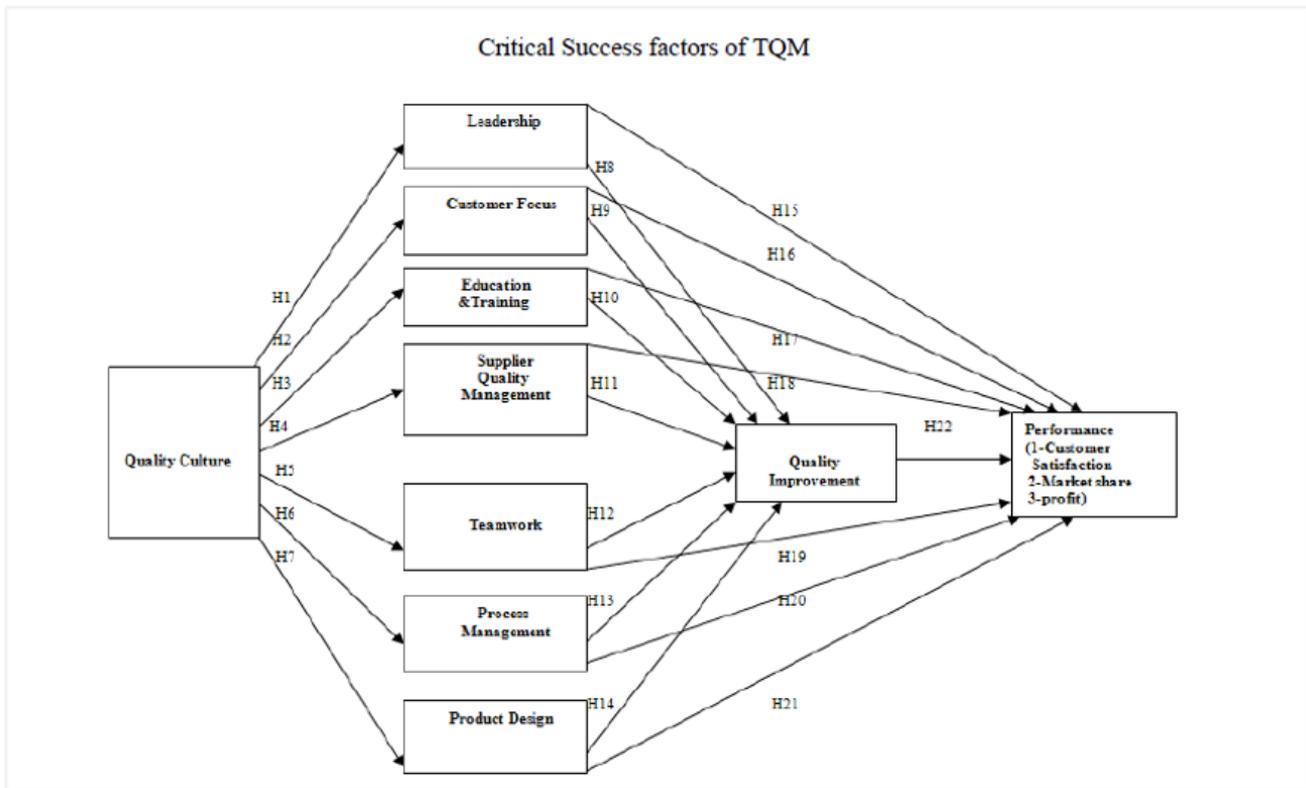


Figure 16 CSFs in Automation Industry (Arumugam, Mojtahedzadeh & Malarvizhi, 2011)

Jain and Ajmera (2019) studies how CSF affects the implementation of lean manufacturing concepts in healthcare organizations. They concluded that the main priority and most important CSFs that have the most influence and impact on Lean implementation are goal specificity, lean leadership, clear organizational vision, ability to finance, professional organizational culture, Lean training, competencies and expertise, and values. Additionally, they are patient participation in the quality program, staff involvement, teamwork and cross-departmental collaboration, time constraints for Lean implementation, staff resistance to Lean culture, communication and results of objectives, and monitoring and evaluation.

Serial no.	Variables	References/sources
1	Goal specificity	Patri and Suresh (2018), Langabeer <i>et al.</i> (2009)
2	Lean leadership	Bercaw (2013), Patri and Suresh (2018), Lukas <i>et al.</i> (2007), Naik <i>et al.</i> (2012)
3	Clarity of organizational vision	Achanga <i>et al.</i> (2006)
4	Financial capability	Achanga <i>et al.</i> (2006), Fadly Habidin and Mohd Yusof (2013)
5	Professional organizational culture	Achanga <i>et al.</i> (2006); Bañuelas and Antony (2001); Kim <i>et al.</i> (2006)
6	Lean training	Patri and Suresh (2018), Lukas <i>et al.</i> (2007)
7	Competency and expertise	Fadly Habidin and Mohd Yusof (2013)
8	Value addition	Bercaw (2013)
9	Patient's involvement in quality program	Burgess and Radnor (2013)
10	Employee engagement	Burgess and Radnor (2013), Pettersen (2009); Drotz and Poksinska (2014)
11	Teamwork and Interdepartmental Cooperation	Hines <i>et al.</i> (2004)
12	Time constraint for lean implementation	Womack and Jones (1997), Patri and Suresh (2018)
13	Employee resistance to lean culture	Womack and Jones (1997), Langabeer <i>et al.</i> (2009); Pettersen (2009), Drotz and Poksinska (2014)
14	Communication of goals and results	Banuelas Coronado and Antony (2002)
15	Follow up and evaluation	Halling and Wijk (2013)

Figure 17 CSF of Lean Implementation in healthcare (Jain & Ajmera, 2019)

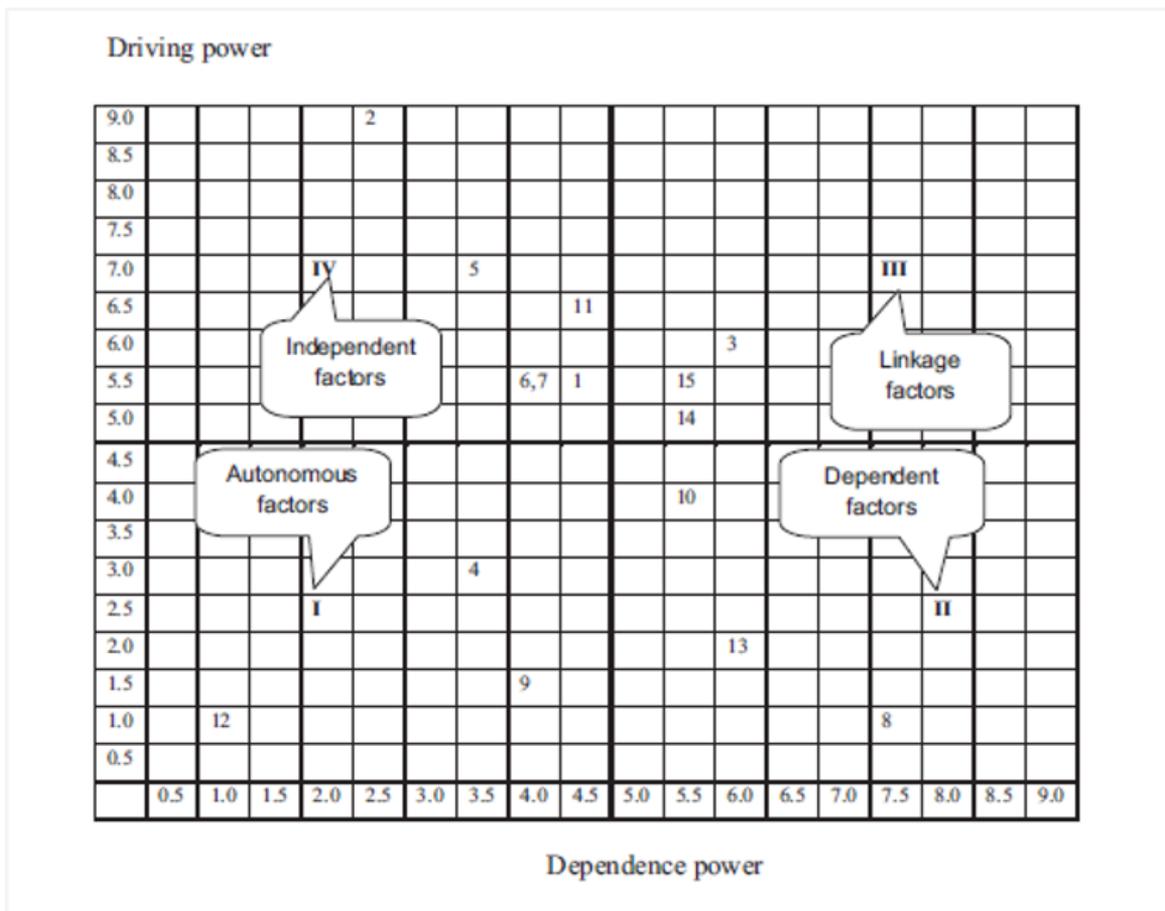


Figure 18 Clusters of factors affecting lean management (Jain & Ajmera, 2019)

Moheel, Alkatheri, AlSukhayri and AbdulAziz (2019) have studied the following CSFs affecting the implementation of TQM, in software:

Commitment to management and leadership key, customer/concentration, organizational culture, quality management, quality measures, managerial managers, employee empowerment, participants and attitudes and improvements, continuous and comparative analysis, infrastructure and grassroots, risk management, contact, decrease cycle time, strategic quality planning/politics, supplier management, simple forming/evolutionary development, the role of quality services, product design processes.

According to Kumar & Sharma, (2017), after the CSFs research affects the implementation of TQM at seven multinational companies, and receives the intervention of experts and undergoes new document evaluation, the final number of CSFs is 14 as follows:

Product and production leadership, development of competitive strategy, continuous quality improvement, without disability, customer satisfaction and customer service, integrated human resource practice, decrease Product cost, improving cycle time and main time, a feedback system, training staff, more investment in developing new products, tools and engineering of TQM, organizational culture and workteam.

Salaheldin (2009) has studied CSFs to implement TQM in small -and medium- size enterprises and assess their impact on overall performance, although it divides CSFs into three main types of strategic factors, tactical factors. The active factor, with a total of 24 factors, concludes that most factors are the biggest strategic factors with the implementation of TQM, in addition to their impact on the other non-organic factors. Tactical factors are less important than strategic elements and less important factors than strategic factors.

the following factors have been mentioned: strategic factors include leadership, organizational culture, management support, continuous improvement and benchmarking.

Tactical factors include quality goals and policies, group consolidation and problem solving, employee empowerment, employee participation, staff training, information technology, public technology, quality of suppliers, supplier relationships, evaluation of supplier performance, and operating factors. Product design and service include performance data of the enterprise to control the process of TQM, customer-oriented, customer relationship management, the process of adding resource value, schedule for implementing TQM in fact, knowledge of customers and markets, resource conservation and use, and inspection and use.

Elsafty and Seddek (2022) conducted a qualitative analysis of the most critical and important CSFs that affect the proper implementation of the excellence model in Egypt's public sector by interviewing experts in excellence fields who have in-depth knowledge of excellence models and implementation. They concluded that the most top five factors that would drive any public sector institution to implement the excellence mode successfully are leadership, human asstes, culture, performance maanement system.

3. Methodology

3.1 Theoretical Framework

The study employs a quantitative approach to validate the findings of (Elsafty & Seddek, 2022), in order to determine quantitatively the most dominant CSFs, as well as the potential relationship between CSFs, whether parent CSF or Sub CSF, and how it can affect excellence implementation in either a positive or negative way.

The sample size is 49, according to Raosoft, with a confidence parentage of 91.5 percent and an error margin of 12%. The total population will be estimated using the Table 2. EGEA Summary Figures (2021). The 903 EGEA stakeholders include both government bodies that used the government excellence model in round two of the main award category, such as universities and local government units, as well as assessors that took part in assessment cycle two.

3.2 Research Questions

MjRO1: What are the most influential CSFs excellence implementation effects of in public sector?

MinRQ1: What are the most influential CSFs that have an impact on the implementation of excellence model in the public sector?

MinRQ2: Are human assets regarded as one of the most dominant CSFs of excellence models in the public sector?

MinRQ3: Is culture regarded as one of the most dominant CSFs of excellence models in the public sector?

MinRQ4: Is excellence model regarded as one of the most dominant CSFs of excellence models in the public sector?

MinRQ5: Is performance management system regarded as one of the most dominant CSFs of excellence models in the public sector?

MinRQ6: Is there a relation between process design & improvement and data reliability & intelligence?

MinRQ7: Is there a relation between rewards & recognition and performance management system?

MinRQ8: Is there a relation between trust and culture?

MinRQ9: Is there a relation between digital infrastructure & transformation and data reliability & intelligence?

MinRQ10: Is there a relation between data reliability & intelligence and human assets?

MinRQ11: Is there a relation between leadership and governance?

MinRQ12: Is there a relation between rewards & recognition and change management?

MinRQ13: Is there a relation between rewards & recognition and leadership?

MinRQ14: Is there a relation between innovation readiness and excellence model?

MinRQ15: Is there a relation between change management and excellence model?

MinRQ16: Is there a relation between change management and culture?

3.3 Hypotheses

- H1:** Leadership is regarded as one of the most dominant CSFs of excellence models in the public sector.
- H2:** Human assets are regarded as one of the most dominant CSFs of excellence models in the public sector.
- H3:** Culture is regarded as one of the most dominant CSFs of excellence models in the public sector.
- H4:** Excellence model is regarded as one of the most dominant CSFs of excellence models in the public sector.
- H5:** Performance management system is regarded as one of the most dominant CSFs of excellence models in the public sector.
- H6:** There is a relation between process design & improvement and data reliability & intelligence.
- H7:** There is a relation between rewards & recognition and performance management system.
- H8:** There is a relation between trust and culture.
- H9:** There is a relation between digital infrastructure & transformation and data reliability & intelligence.
- H10:** There is a relation between data reliability& intelligence and human assets.
- H11:** There is a relation between leadership and governance.
- H12:** There is a relation between rewards & recognition and change management.
- H13:** There is a relation between rewards & recognition and leadership.
- H14:** There is a relation between innovation readiness and excellence model.
- H15:** There is a relation between change management and excellence model.
- H16:** There is a relation between change management and culture.

4. Data Analysis, Results and Discussion

4.1 Introduction

data from the study survey are sorted out and presented. The chapter starts with a sample profile of the survey respondents using descriptive analysis for categorical data (frequencies and percentages). Next, the reliability of the CSFs Rating scale was examined using Cronbach's alpha reliability coefficient, and the reliability of the relationship of CSFs scale was examined by applying a special case of Cronbach's alpha. Exploratory Factor Analysis was conducted to test the first set of the research hypotheses. Correlation analysis was conducted to test the second set of the research hypotheses. Finally, independent-samples t-tests were performed to find how CSFs affect Excellence Implementation in the public sector.

The statistical analysis was conducted using IBM SPSS Statistics v.28, and significance level of α was set at 0.09 from prior determination by the study researcher.

4.2. Sample Profile

The research sample characteristics are presented in Table 3. The summary shows that the sample vast majority is composed of Egyptians representing 93.9% of the total sample. The majority 80.9% of the sample are males. The sample is almost of young age, as 73.5% are between 30 to 50 years. Similarly, respondents seem to be well experienced, as 75.5% of the total sample have at least 15 years of experience. Also, the sample seems to be highly educated, as the majority 51.0% hold PhDs and 34.7% hold Master degrees, in addition to their Bachelor degrees.

The majority 71.4% of respondents participated in Excellence Awards Assessments at least twice. The majority 63.3% of respondents are Team Members, 42.9% are Team Leaders, 24.5% are Quality Assurance, and only one respondent is Jury.

Personal Information	n (%)	Personal Information	n (%)
Nationality		Gender	
Australian	1 (2.0%)	Female	9 (19.1%)
Egyptian	46 (93.9%)	Male	38 (80.9%)
Emirati	1 (2.0%)	Missing	2
Sudanese	1 (2.0%)	Years of Experience	
Age Category		5 – 10 years	4 (8.2%)
Between 30 & 40	17 (34.7%)	10 – 15 years	8 (16.3%)
Between 40 & 50	19 (38.8%)	15 – 20 years	13 (26.5%)
More than 50	13 (26.5%)	More than 20 years	24 (49.0%)
Educational Level		Participation in Excellence Awards Assessments	
Bachelor Degree	10 (20.4%)	Once	14 (28.6%)
Master Degree	17 (34.7%)	Twice	8 (16.3%)
PhD Degree	25 (51.0%)	Thrice	10 (20.4%)
Role of Responsibilities in Assessments Teams		More than thrice	17 (34.7%)
Team Member	31 (63.3%)		
Team Leader	21 (42.9%)		
Quality Assurance	12 (24.5%)		
Jury	1 (2.0%)		

Table 3. Sample Descriptive Summary - N=49

4.3. Reliability Analysis of Survey Questions

4.3.1 Rating of CSF

As the CSF Rating is measured on a Likert scale (Glen, n.d.), its internal consistency is assessed using Cronbach’s alpha, α , reliability coefficient, developed by Cronbach (1951). Reliability statistics are presented in Table 4, indicating that Cronbach’s alpha showed the questionnaire to reach acceptable reliability, $\alpha = 0.89$ (Kline, 1999). Most items appeared to be worthy of retention, resulting in a decrease in the alpha if deleted. The values of Corrected Item-Total Correlation (CITC) indicate that almost all items belong to the CSF Rating scale. Although Leadership and Culture had CITC values below 0.3 (Pedhazur & Schmelkin, 1991), the increase in alpha if these items were deleted is slight and not necessary. The mean scores for the items ranged between a minimum of 3.96 (for Benchmarking) and a maximum of 4.84 (for Leadership), indicating that the majority of respondents’ scores are between ‘Critical’ and ‘Very Critical’. Standard deviations are also presented in the table. The scores percentages are graphically illustrated in Figure 21.

Overall $\alpha = .891$ (18 items)	CIT C	α^*	M	SD	RC	Rank
1. Leadership	.123	.894	4.84	.373	96.8%	1
2. Human Assets	.477	.887	4.41	.674	88.2%	5
3. Culture	.251	.895	4.27	.836	85.4%	10
4. Excellence Model	.391	.890	4.31	.847	86.2%	8
5. Performance Management System	.583	.884	4.41	.674	88.2%	5
6. Internal Stakeholder Management	.550	.885	3.98	.721	79.6%	17
7. Policy Strategy	.543	.885	4.47	.739	89.4%	3
8. Identification of Customer Expectation and Measurement of Perception	.570	.884	4.47	.649	89.4%	3
9. Customer Focus	.338	.891	4.53	.739	90.6%	2
10. Product Service Design	.737	.878	4.06	.747	81.2%	14
11. Benchmarking	.715	.878	3.96	.841	79.2%	18
12. Change Management	.390	.890	4.27	.730	85.4%	10
13. Digital Infrastructure	.463	.887	4.31	.713	86.2%	8
14. Governance	.523	.885	4.39	.786	87.8%	7
15. Citizenship Trust	.624	.882	4.14	.866	82.8%	12
16. Rewards Recognitions	.700	.880	4.12	.696	82.4%	13
17. Data Reliability Intelligence	.683	.879	4.00	.890	80.0%	15
18. Innovation Readiness	.742	.877	4.00	.890	80.0%	15
Overall CSF Rating Scale			4.27	.446		

Table 4. Reliability Statistics for Ratings of CSF

According to the values of Relative Criticality (RC), on the top of CSFs is Leadership with RC = 96.8%, followed by Customer Focus (RC = 90.6%). In the third position comes Policy Strategy and Identification of Customer Expectation and Measurement of Perception, with equal RC of 89.4%. Human Assets and Performance Management System comes fifth, with equal RC of 88.2%.

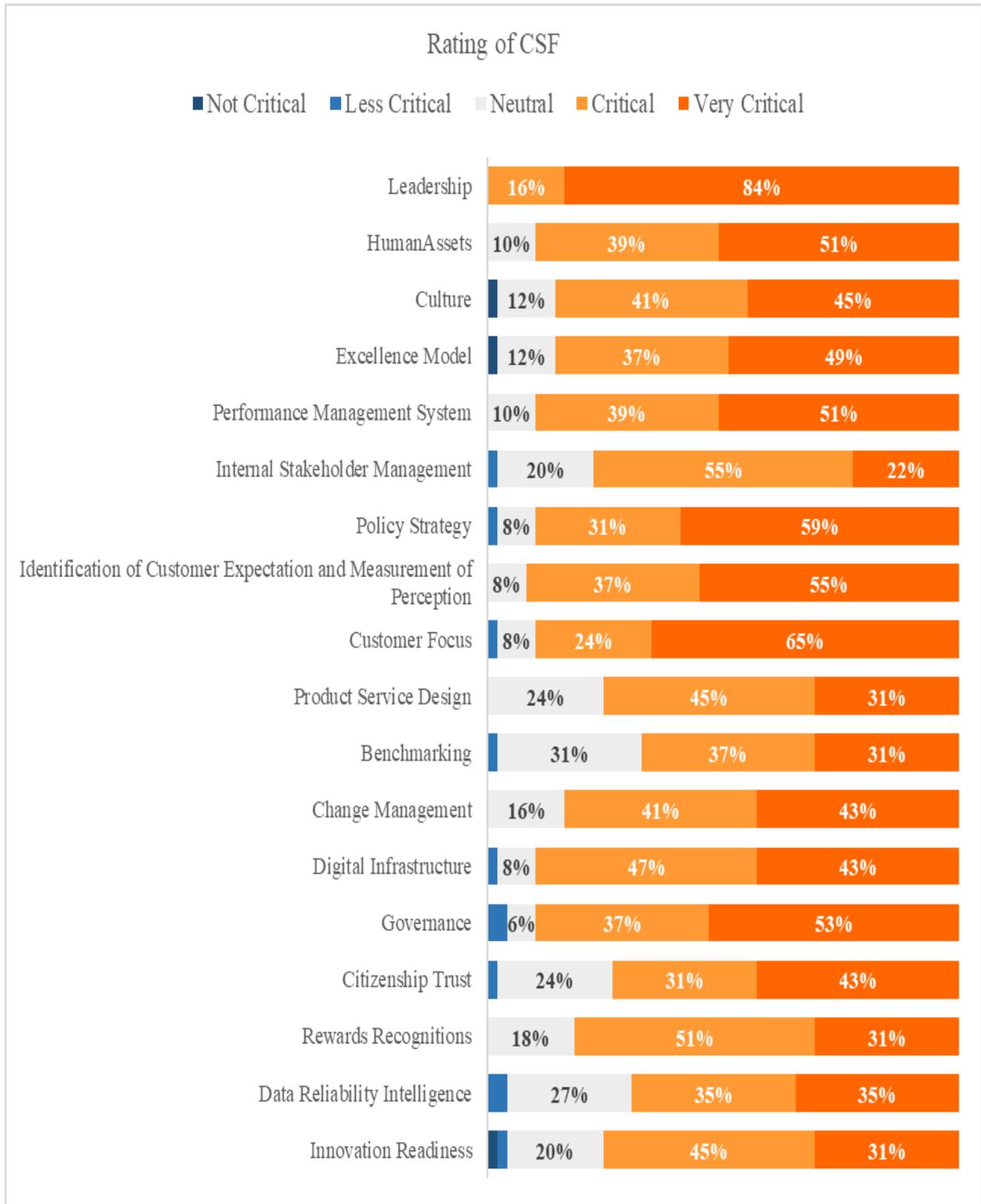


Figure 21 Rating of CSF Score Percent

4.3.2 Relationship Among CSFs

This scale was measured on a binary scale (0=No, 1=Yes), so Cronbach's alpha cannot be used to measure its internal consistency. Rather, a special case of it, Kuder-Richardson Formula 20 (KR-20) (Kuder, G. F., & Richardson, M. W., 1937), was used as it is computed for dichotomous scores (Cortina, J. M., 1993; Ritter, Nicola L., 2010). Just like Cronbach's alpha, the scores for KR-20 range from 0 to 1, where 0 is no reliability and 1 is perfect reliability. The closer the score is to 1, the more reliable the test is. It is often claimed that a high KR-20 coefficient (e.g., >0.90) indicates a homogeneous scale. However, according to Glen (n.d.), a score of above 0.5 is usually considered reasonable. It was calculated in MS Excel using the following formula (Equation 1).

Equation 1. KR-20 Formula from Wikipedia contributors, 2022

$$KR20 = \left[\frac{k}{(k-1)} \right] * \left[\frac{1 - (\sum_i^k p_i q_i)}{\sigma^2} \right]$$

where:

k = number of items, i = an item score, σ^2 = variance of all responses, p = proportion of people saying YES to the item, q = proportion of people saying NO to the item, and Σ = sum up (add up). Steps of calculations was performed in MS Excel using the formula provided by (Wikipedia contributors, 2022). The calculations are indicated in the Appendix. KR-20 was equal to 0.94 (Equation 2), indicating the scale is statistically reliable and homogeneous.

Equation 2. KR-20 Calculation

$$KR20 = \left[\frac{11}{(11 - 1)} \right] * \left[\frac{1 - (0.39)}{1.64^2} \right] = 0.941$$

The responses percentages are presented graphically in Figure 22:

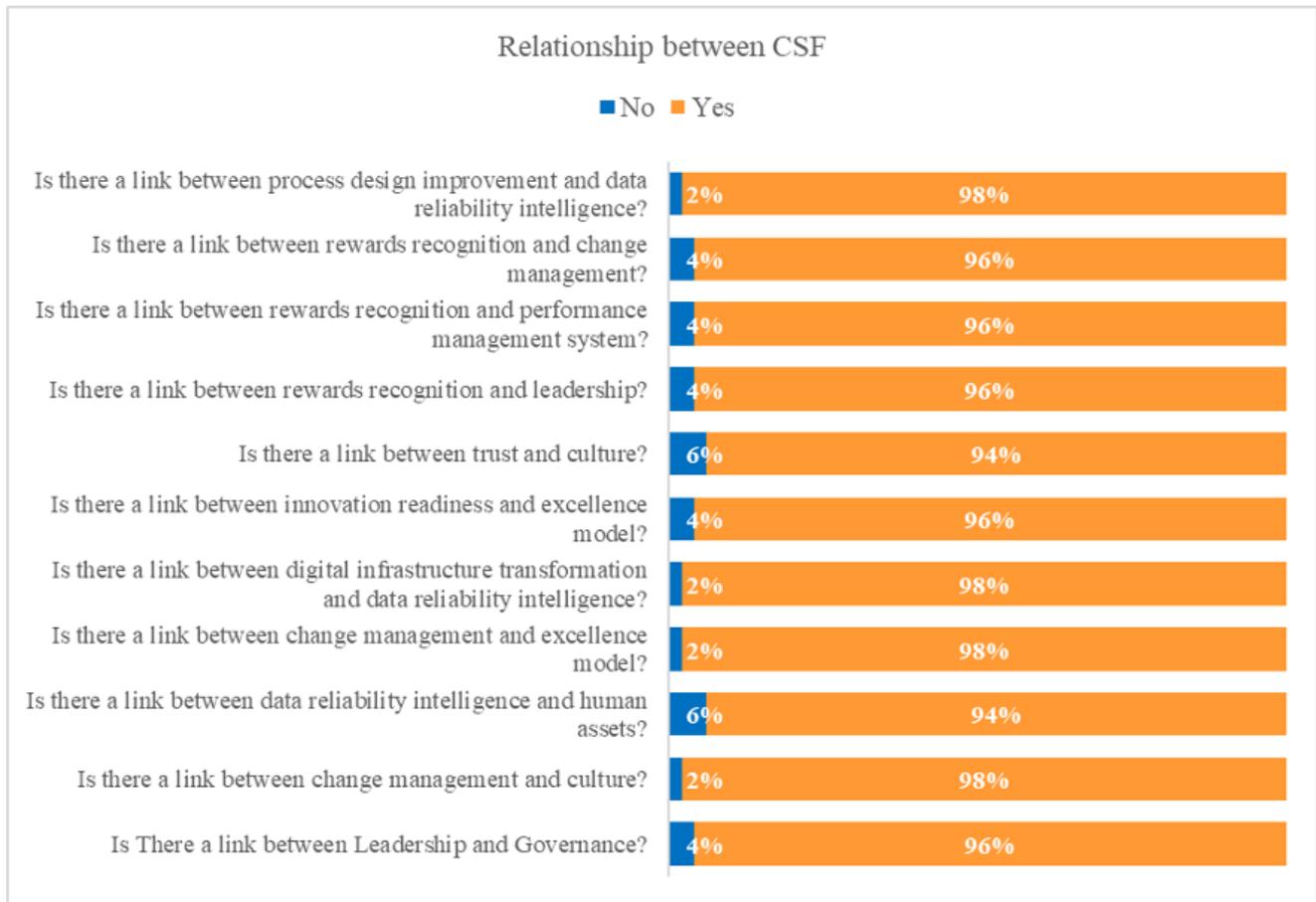


Figure 22 Relationship between CSF Percent Scores

4.4 Hypotheses Testing

In order to test the first five hypotheses, an Exploratory Factor Analysis (EFA) was conducted to determine the most dominant CSF. The second 11 hypotheses were tested by running correlation analysis.

4.4.1 Exploratory Factor Analysis (EFA)

Initially, the factorability of the 18 CSF items was examined. The sample size of the current study N=49 was sufficient for performing the EFA based on the study by de Winter* et al. (2009), which provided evidence that EFA can yield reliable results for N well below 50.

Some common criteria for the factorability of a correlation were used. First, it was found that 16 out of 18 items correlated at least 0.3 with at least one other item, suggesting reasonable factorability (see Appendix).

Second, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.75, above the commonly recommended value of 0.6, and Bartlett’s test of sphericity was significant ($\chi^2(153) = 414.53$, $p < 0.001$), see Table 5. The diagonals of the anti-image correlation matrix (MSA) were also all over 0.5, see Table 6.

Finally, the communalities were all above 0.3, further confirming that each item shared some common variance with other items, see Table 6. Although Leadership had MSA of 0.328 (<0.5), but it is recommended to retain it in the model as it had a high communality of 0.872 and it loaded highly on the sixth factor.

Given those indicators, factor analysis was deemed to be suitable with all 18 items.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.753
Bartlett's Test of Sphericity	Approx. Chi-Square	414.526
	df	153
	Sig.	<.001

Table 5. KMO and Bartlett's Test

Principal components analysis was used because the primary purpose was to identify the most dominant CSF; i.e., to indicate the most dominant factors. Initial eigen values indicated that the first, second, third, fourth, and fifth factors explained 37.13%, 10.14%, 8.10%, 7.04%, and 6.76% of the variance, respectively. The sixth factor had eigenvalue just over one (see Figure 22), and explained 5.79% of the variance. The analysis produced a six-factor solution examined using Promax rotation of the factor loading matrix. The solution explained 74.95% of the variance.

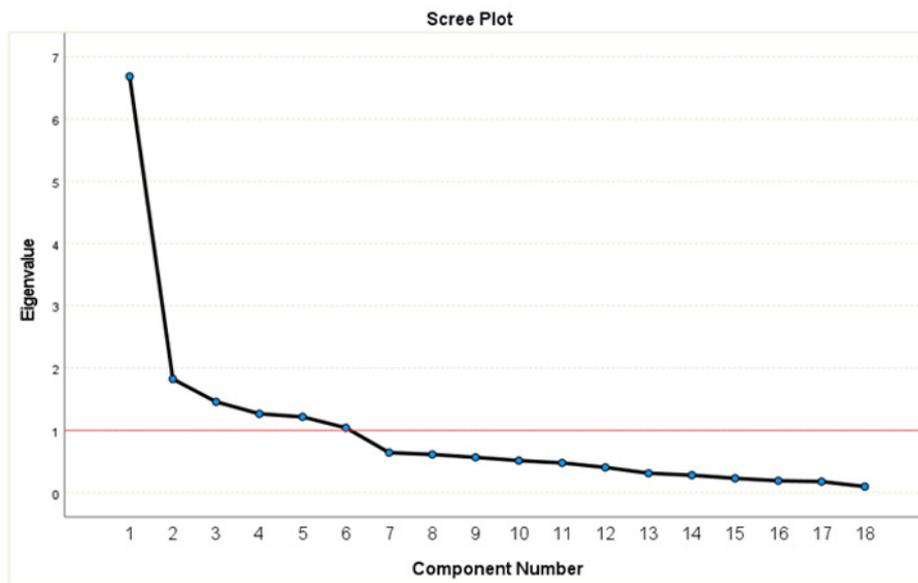


Figure 23 Scree Plot

The factor-loading matrix for this six-factor solution is presented in Table 6. All items in the analysis had primary loadings over 0.3. Some items had cross-loading on other factors; however, they strongly loaded on the primary factors.

Internal consistency for each of the factors was examined using Cronbach's alpha. The alphas were satisfactory for the first factor (7 items) $\alpha = 0.85$, and moderate for the second (2 items), third (3 items), fourth (3 items), and fifth (2 items) factors; alphas were 0.64, 0.76, 0.68, and 0.61, respectively. The sixth factor had Leadership only loading on it, so no Cronbach's alpha was calculated for this factor.

Overall, this analysis showed that the most distinct factor was the first factor that included the seven items: (1) Identification of Customer Expectation and Measurement of Perception, (2) Policy Strategy, (3) Customer Focus, (4) Performance Management System, (5) Innovation Readiness, (6) Benchmarking, and (7) Rewards Recognitions. These items would indicate the most dominant CSFs, as they had the highest percentage of variance explained.

The second factor included: (1) Governance, and (2) Internal Stakeholder Management as the second dominant group of items of the CSF, explaining 10.14% of the total variance. The third factor included: (1) Human Assets, (2) Data Reliability Intelligence, and (3) Product Service Design as the third dominant group of items of the CSF, explaining 8.10% of the total variance. The fourth factor included: (1) Change Management, (2) Citizenship Trust, and (3) Digital Infrastructure, as the fourth dominant group of items of CSF, explaining 7.04% of the total variance. Finally, the fifth factor included: (1) Culture and (2) Excellence Model as the fifth group of dominant items of CSF, explaining 6.76% of the total variance.

Leadership was not correlated with any of the CSF items and loaded solely highly on the sixth factor (factor loading = 0.95), explaining 5.79% of the variance, standing alone. This may suggest a high domination of this item over the other 17 items of the CSF scale.

CSF Items	Component						MS A	COM
	1	2	3	4	5	6		
Identification of Customer Expectation and Measurement of Perception	.827						.772	.664
Policy Strategy	.742	.352	-.476				.649	.755
Customer Focus	.709	-.605					.750	.771
Performance Management System	.623	.314					.784	.651
Innovation Readiness	.576		.311				.825	.731
Benchmarking	.460			.309			.930	.640
Rewards Recognitions	.436			.331			.849	.738
Governance		.915		-.342			.743	.778
Internal Stakeholder Management		.897					.634	.755
Human Assets			1.023				.593	.817
Data Reliability Intelligence			.632				.842	.739
Product Service Design		.314	.384		.335		.755	.707
Change Management		-.321		1.032			.693	.828
Citizenship Trust		.367		.459			.864	.706
Digital Infrastructure	-.391		.432	.453			.726	.827
Culture					.831		.542	.778
Excellence Model					.768	-.301	.705	.734
Leadership						.951	.328	.872
Initial Eigenvalues	6.68	1.83	1.46	1.27	1.22	1.04		
% of Variance Explained (74.95%)	37.13	10.14	8.10	7.04	6.76	5.79		
Cronbach's alpha (.891)	.850	.750	.762	.684	.613	-		

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 12 iterations.

Table 6. Factor Loadings, MSA, and Communalities based on Principal Components Analy with Promax Rotation for 18 Items of CSF (N=49)

Based on the EFA, it can be concluded that Leadership is regarded as one of the most dominant CSFs of excellence models in the public sector. Similarly, Human Assets, Culture, Excellence Model, and Performance Management System are regarded as one of the most dominant CSFs of excellence models in the public sector. However, based on the factor structure produced by the EFA, the order of these CSFs items could be set based on their dominance in the model as: (1) Leadership, (2) Performance Management System, (3) Human Assets, (4) Culture, and (5) Excellence Model. Therefore, the five hypotheses of the study were supported and validated.

4.4.2 Correlation Analysis

Pearson’s r correlation coefficient was used to measure the relationship between CSF items; results of the analysis are presented in Table 10 attached to Appendix B. The analysis results are summarized in Table 7, showing that there were significant positive relationships among Process Design & Improvement and Data Reliability & Intelligence ($r = 0.564$), Rewards & Recognition and Performance Management System ($r = 0.512$), Digital Infrastructure & Transformation and Data Reliability & Intelligence ($r = 0.492$), Data Reliability & Intelligence and Human Assets ($r = 0.521$), and between Rewards & Recognition and Change Management ($r = 0.386$). Therefore, only five hypotheses out of 11 were supported and validated.

Relationships		Pearson’s r	Hypothesis
Process Design & Improvement	↔ Data Reliability & Intelligence	.564**	Supported
Rewards & Recognition	↔ Performance Management System	.512**	Supported
Trust	↔ Culture	.090	Not supported
Digital Infrastructure & Transformation	↔ Data Reliability & Intelligence	.492**	Supported
Data Reliability & Intelligence	↔ Human Assets	.521**	Supported
Leadership	↔ Governance	.078	Not supported
Rewards & Recognition	↔ Change Management	.386**	Supported
Rewards & Recognition	↔ Leadership	-.002	Not supported
Innovation Readiness	↔ Excellence Model	.277	Not supported
Change Management	↔ Excellence Model	.203	Not supported
Change Management	↔ Culture	.121	Not supported

** Correlation is significant at the 0.01 level (2-tailed).

Table 7. Results of Correlation Analysis

4.4.3 How Can CSF Affect Excellence Implementation?

Based on the participants' responses to the relationship between CSF questions, the effects of these relationships on the Implementation of Excellence in the public sector were tested using independent-samples t-test. The results are summarized in Table 8, and it revealed some interesting effects, as explained below.

- The relationships between Process Design & Improvement and Data Reliability & Intelligence, Digital Infrastructure Transformation and Data Reliability Intelligence, Change Management and Excellence Model, and between Change Management and Culture. The test could not be performed since there was only one response in the 'No relationship' group.
- The relationship between Rewards & Recognition and Change Management had a significant positive effect on Performance Management System and Digital Infrastructure. That is, criticality of Performance Management System and Digital Infrastructure is higher when there is a relationship between Rewards & Recognition and Change Management, the mean criticality score of Performance Management System ($M = 4.43$) was significantly higher for respondents who think that this relationship exists than ($M = 4.00$) for those who didn't think so, $t = -4.27$, $p < 0.001$. Similarly, the mean criticality score of Digital Infrastructure ($M = 4.32$) was significantly higher for respondents who think that this relationship exists than ($M = 4.00$) for those who didn't think so, $t = -3.02$, $p < 0.09$. On the other hand, the relationship between Rewards & Recognition and Change Management had a negative effect on Policy Strategy, Change Management, and Governance. Check means and t-test statistics in Table 8. The mean scores are graphically represented in Figure 23.
- The relationship between Rewards & Recognition and Performance Management System had a negative effect on Human Assets and Change Management, while a positive effect on Culture and Performance Management System. See Figure 24.
- The relationship between Rewards & Recognition and Leadership had the same effect the previous relationship (between Rewards & Recognition and Performance Management System) had. See Figure 25.
- The relationship between Trust and Culture had a negative effect on Leadership, while a positive effect on Performance Management System and Digital Infrastructure. See Figure 26.
- The relationship between Innovation Readiness and Excellence Model had a positive effect on Culture, Performance Management System, and Digital Infrastructure, while a negative effect on Identification of Customer Expectation and Measurement of Perception. See Figure 27.

- The relationship between Data Reliability Intelligence and Human Assets had a positive relationship on Culture and Performance Management System, while it had a negative effect on Leadership.
- Finally, the relationship between Leadership and Governance had a positive effect on Culture and Performance Management System, while it had a negative effect on Excellence Model, Policy Strategy, and Change Management.

Relationship	t tests			Effect
	No	Yes	t	
Process Design & Improvement ↔ Data Reliability & Intelligence^a				
Rewards & Recognition ↔ Change Management				
Performance Management System	4.00	4.43	-4.27**	Positive
Policy Strategy	5.00	4.45	5.08**	Negative
Change Management	5.00	4.23	7.21**	Negative
Digital Infrastructure	4.00	4.32	-3.02*	Positive
Governance	5.00	4.36	5.53**	Negative
Rewards & Recognition ↔ Performance Management System				
Human Assets	5.00	4.38	6.24**	Negative
Culture	4.00	4.28	-2.23*	Positive
Performance Management System	3.50	4.45	-2.00*	Positive
Change Management	5.00	4.23	7.21**	Negative
Rewards & Recognition ↔ Leadership				
Human Assets	5.00	4.38	6.24**	Negative
Culture	4.00	4.28	-2.23*	Positive
Performance Management System	3.50	4.45	-2.00*	Positive
Change Management	5.00	4.23	7.21**	Negative
Trust ↔ Culture				
Leadership	5.00	4.83	3.08**	Negative
Performance Management System	4.00	4.43	-4.29**	Positive
Digital Infrastructure	4.00	4.33	-3.02*	Positive
Innovation Readiness ↔ Excellence Model				
Culture	4.00	4.28	-2.23*	Positive
Performance Management System	3.50	4.45	-2.00*	Positive
Identification of Customer Expectation and Measurement of Perception	5.00	4.45	5.81**	Negative
Digital Infrastructure	4.00	4.32	-3.02*	Positive
Digital Infrastructure Transformation ↔ Data Reliability Intelligence^a				
Change Management ↔ Excellence Model^a				
Data Reliability Intelligence ↔ Human Assets				
Leadership	5.00	4.83	3.08*	Negative
Culture	4.00	4.28	-2.23*	Positive
Performance Management System	3.67	4.46	-2.03*	Positive
Change Management ↔ Culture^a				
Leadership ↔ Governance				
Culture	4.00	4.28	-2.23*	Positive
Excellence Model	5.00	4.28	5.82**	Negative
Performance Management System	4.00	4.43	-4.27**	Positive
Policy Strategy	5.00	4.45	5.08**	Negative
Change Management	5.00	4.23	7.21**	Negative

a. Effect cannot be computed because there is only one response in the 'No' group.

*. Significant at $\alpha < .09$. **. Significant at $\alpha < .001$.

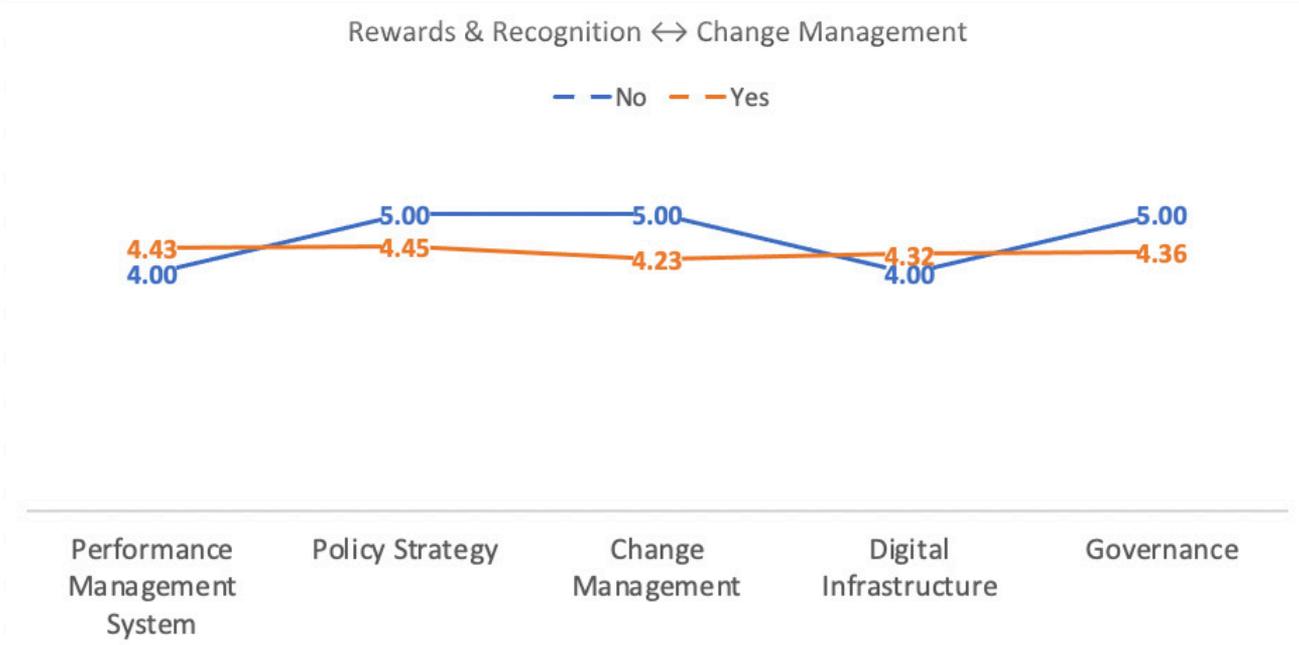


Figure 24 Mean Criticality Score for the Relationship between Rewards & Recognition and Change Management across Significantly Affected CSF

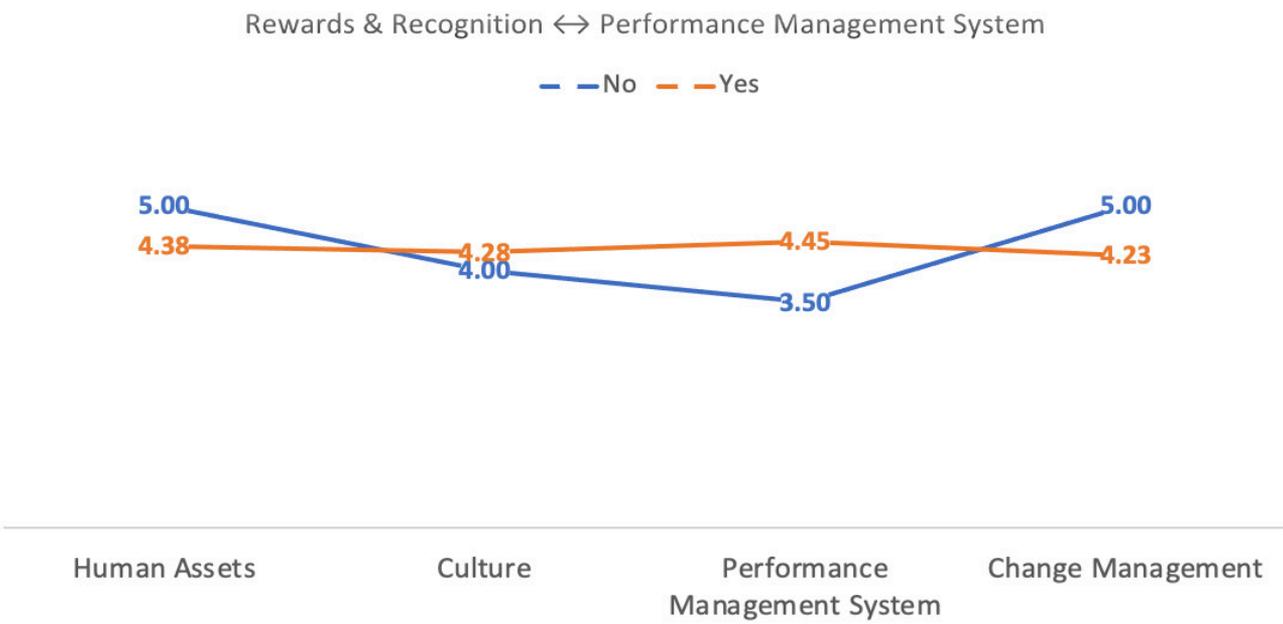


Figure 25 Mean Criticality Score for the Relationship between Rewards & Recognition and Performance Management System across Significantly Affected CSF

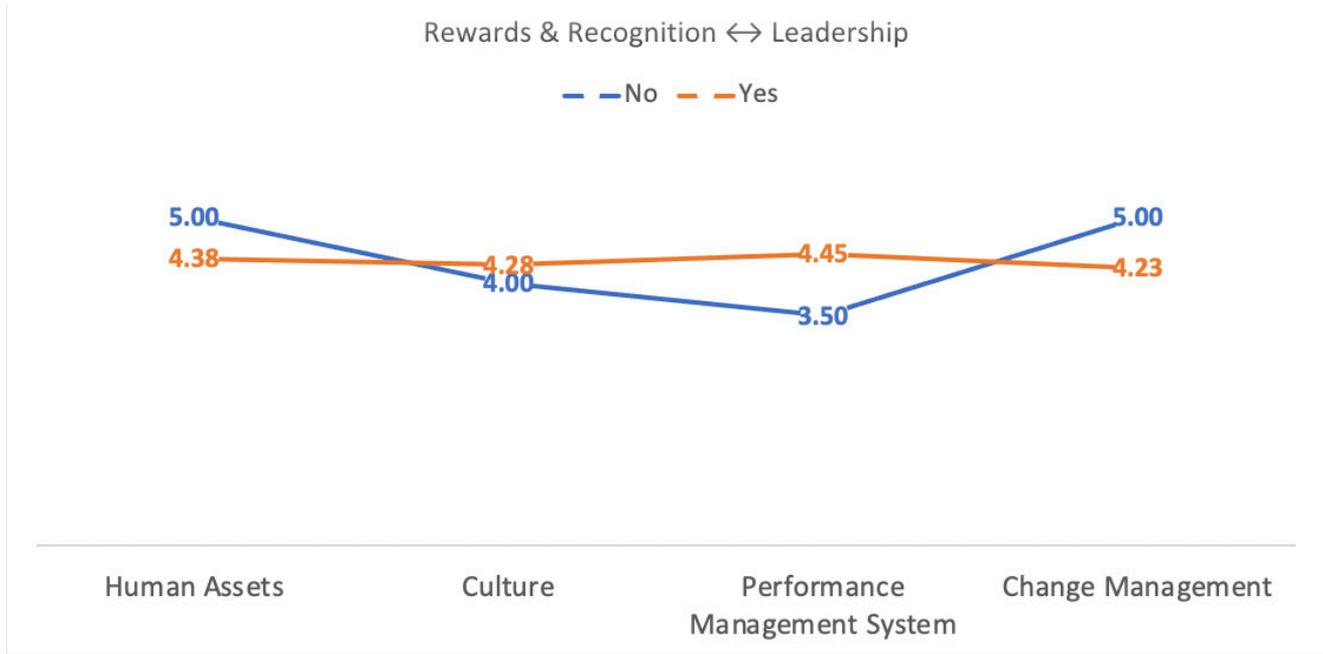


Figure 26 Mean Criticality Score for the Relationship between Rewards & Recognition and Leadership across Significantly Affected CSF

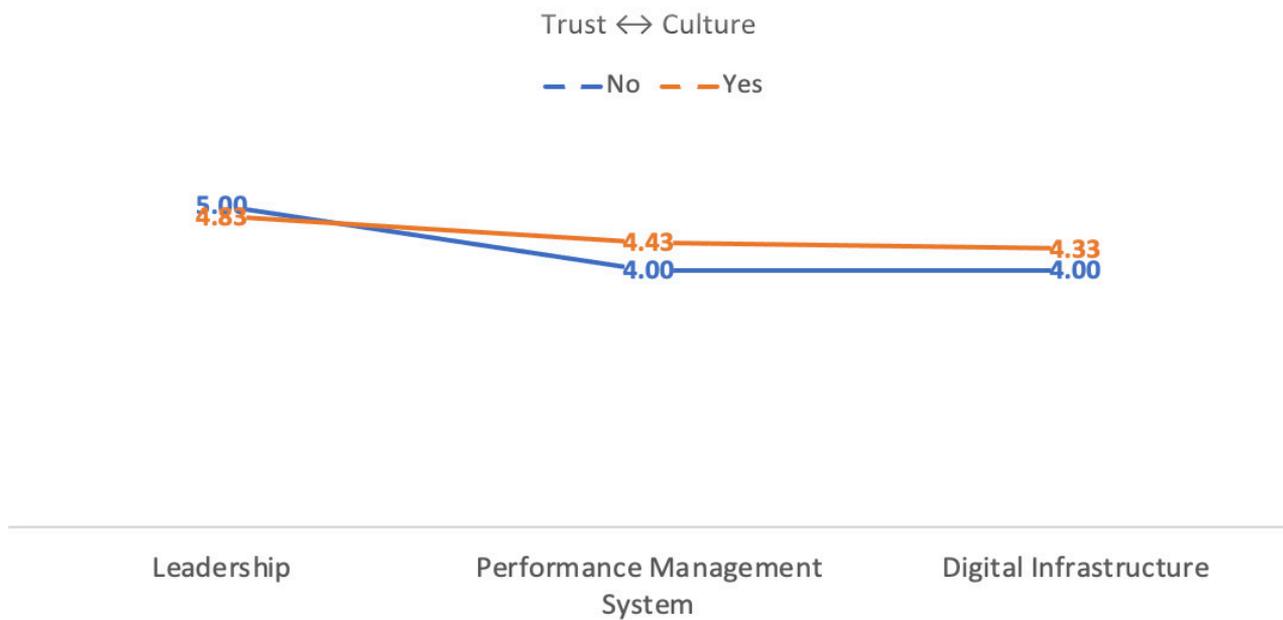


Figure 27 Mean Criticality Score for the Relationship between Trust and Culture across Significantly Affected CSF

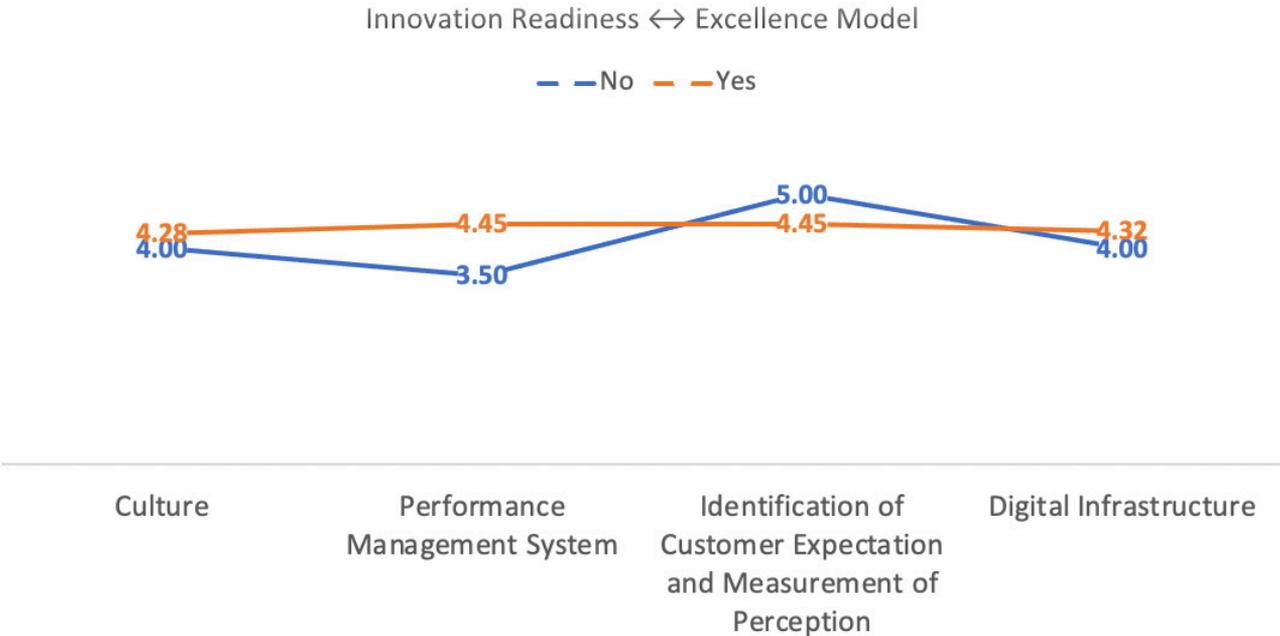


Figure 28 Mean Criticality Score for the Relationship between Innovation Readiness and Excellence Model across Significantly Affected CSF

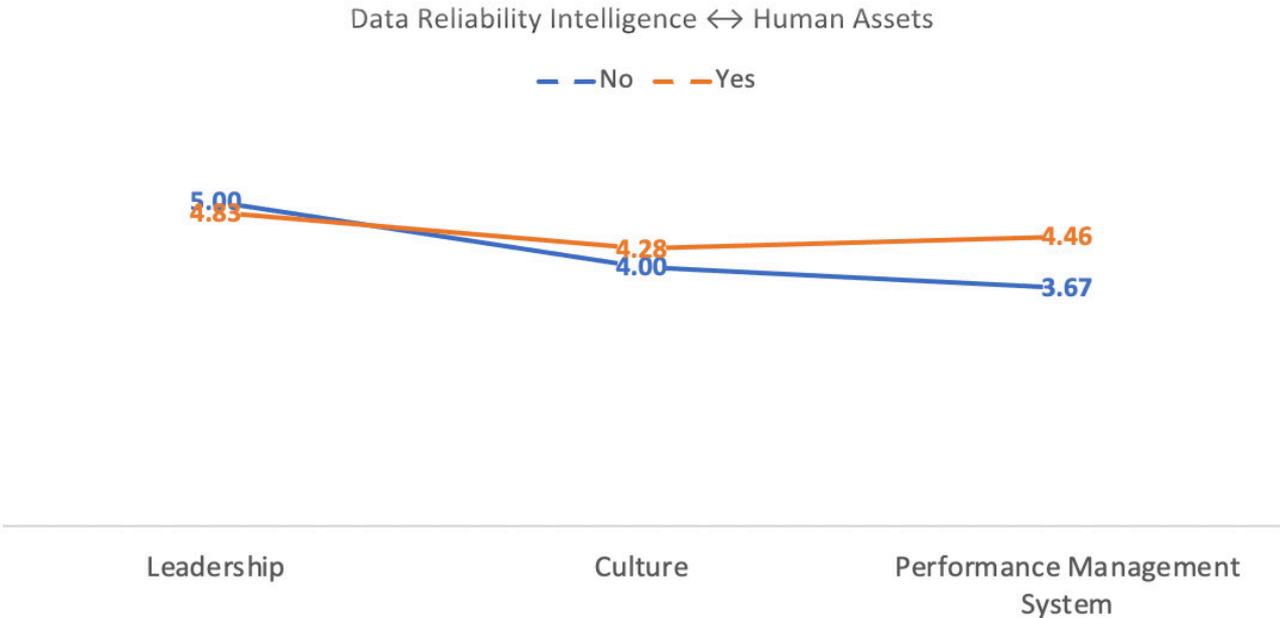


Figure 29 Mean Criticality Score for the Relationship between Data Reliability Intelligence and Human Assets across Significantly Affected CSF

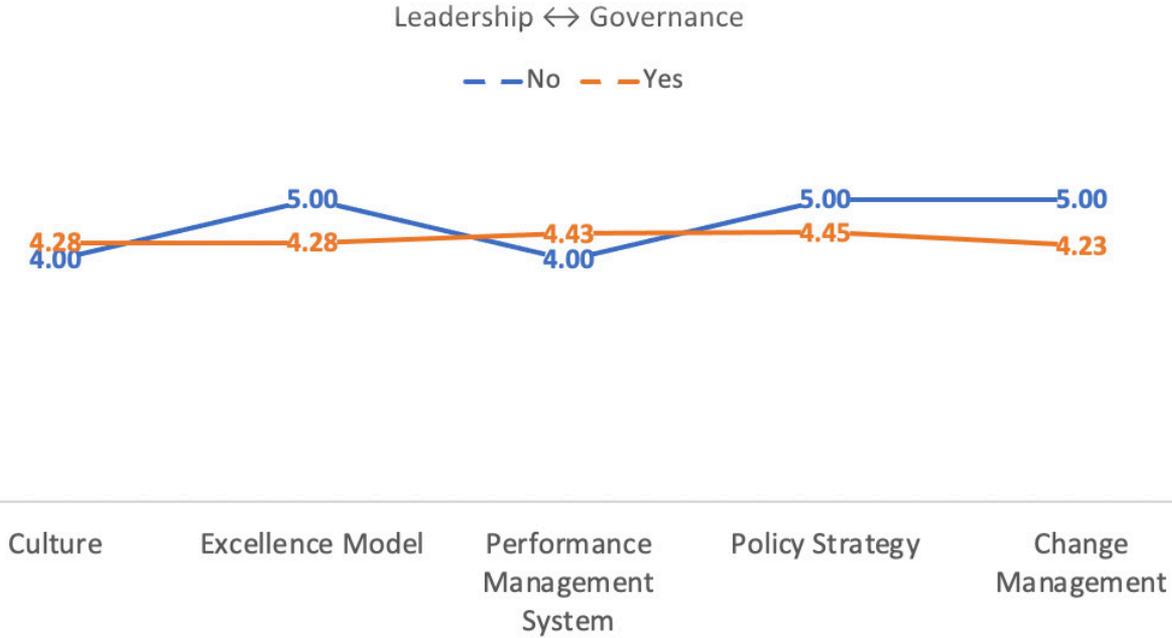


Figure 30 Mean Criticality Score for the Relationship between Leadership and Governance across Significantly Affected CSF

5. Conclusion

5.1 CSF Validation

It can be stated that the conclusions of (Elsafty & Seddek, 2022), which include leadership, human assets, culture, excellence model, and performance management system, are validated as main CSFs that affect proper implementation of excellence model in public sector. However, the CSF's priority order has altered to: (1) Leadership, (2) Performance Management System, (3) Human Assets, (4) Culture, and (5) Excellence Model, in order of criticality.

According to EFA, CSF has been divided into six factors or groups based on their criticality and dominance; consequently, when implementing the excellence model in the public sector, any public institution should take into account those aspects based on their criticality.

- 1st factor/group (Highest criticality) includes: (1) Identification of Customer Expectation and Measurement of Perception, (2) Policy Strategy, (3) Customer Focus, (4) Performance Management System, (5) Innovation Readiness, (6) Benchmarking, and (7) Rewards Recognitions.
- 2nd factor/group: (1) Governance and (2) Internal Stakeholder Management.
- 3rd factor/group: (1) Human Assets, (2) Data Reliability Intelligence, and (3) Product Service Design as the third dominant.
- 4th factor/group: (1) Change Management, (2) Citizenship Trust, and (3) Digital Infrastructure.
- 5th factor/group: (1) Culture and (2) Excellence Model.
- 6th factor/group: As it weighed alone away from other CSF, leadership is deemed to have a high effect CSF.

As a result, when implementing the excellence model in the public sector, the organization should consider the factors/groups of CSF in order of their ranking in EFA. This is because public institutions can gradually consider CSF while implementing excellence model criteria, starting with the most basic and applicable CSF, such as the sixth factor, then the fifth, fourth, third, second, and first, until reaching the most critical and impact CSF.

5.2 CSF Relation Validation

The relationship among CSFs, as discussed by (Elsafty & Seddek, 2022), has been investigated in order to validate the remaining hypothesis. As shown in table 7, some relationships have been validated while others have not, allowing any public institution to take into account the relationship among CSF when implementing the excellence model.

The most significant link was between Process Design & Improvement and Data Reliability & Intelligence, as it is obvious that any public institution attempting to redesign or reengineer any business process for the development sector must do so using reliable historical and future data as well as some level of intelligence to aid decision making.

The relationship between Rewards & Recognition and Performance Management Systems is critical because when tools for employee rewards and recognitions are combined with a performance management system, the organization can design valid and appropriate measures for employee performance and evaluation to be properly rewarded.

The relationship between Digital Infrastructure & Transformation and Data Reliability & Intelligence is also very clear, particularly when any public organization begins to transform digitally and must consider the type, amount, and location of data targeted to be gathered, in order to develop intelligence and reliability while designing infrastructure.

The link between Data Reliability & Intelligence and Human Assets is quite evident, since valid and trustworthy data from an organization's internal stakeholders may be extremely important, especially when it comes to employee happiness and retention.

The link between rewards and recognition and change management can be shown, since any business that implements any sort of change, must have an appropriate rewarding and recognition system, particularly for individuals who accept and embrace change early in order to develop succession through change.

5.3 Multi-Relation Among CSFs

Despite the fact that some relationships were not validated by the research, there are some compound relationships between more than two CSFs, as shown in table 8, which public sector institutions should consider, in order to enhance or synergize positive relationships while attempting to depreciate or eliminate negative relationships, that have a significant impact on excellence mode implementation. While adopting tools for employee rewards and recognitions, the effect will be synergized when combined with a performance management system, where the organization can design valid and proper measures for employee performance and evaluation to be rewarded appropriately. Furthermore, developing any organization performance management system requires valid tools for measuring data and analysis, so the impact of relationship on digital transformation is critical.

The relationship between leadership and rewards & recognition can be drawn as leadership is considered the main factor that will facilitate adoption of all other factors, such as: rewards & recognition as through leadership the employee rewards & recognitions system can be built and adopted inside any public organization, as that will positively reflects on overall organization culture and performance management system as well.

There is a link between leadership and rewards and recognition because leadership is considered the most important factor that will facilitate the adoption of all other factors. Such factors include rewards

and recognition. Through leadership, an employee rewards and recognition system can be built and adopted within any public organization, it will have a positive impact on the overall organization culture and performance management system.

The relationship between innovation readiness and excellence model delivers a culture of excellence and performance to any public organization, as designing an innovation framework within the organization will drive the organization to better performance and allow it to use innovative ideas in developing its work nature and infrastructure.

Any public organization that adopts an excellence model, such as EFQM or an ISO management system, will integrate it into the change process, with the excellence model serving as the primary driver of new practices and processes. As a result, the relationship between change management and excellence models is critical.

Any change within the organization will foster a culture of hesitancy and uncertainty. Thus, management must exercise extreme caution when adopting or implementing new changes, as they will have a direct impact on the organization's culture; thus, the relationship between change management and culture is critical.

When considering leadership at the outset of CSFs, the relationship between leadership and governance is very synergetic, with leadership within the organisation assisting it in developing a proper governance framework for all processes and activities. Additionally, these relationships will have an enhancing effect on developing a culture that supports excellence model implementation, as well as developing a performance management system that allows the organisation to achieve its goals.

Finally, it can be concluded that there are 18 CSFs that are critical and essential for any public institution seeking to implement any excellence model, but the degree of criticality varies between CSF. As a result, management must prioritize which factors should be considered first and which should be considered later.

The final research guideline is to start thinking about CSFs gradually, starting with the sixth element or group then all other factors/groups, and so on.

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Appendix

Appendix A

	1	2	3	4	5	6	7	8	9	10	11	sum
1	1	1	1	1	1	1	1	1	1	1	1	11
2	1	1	1	1	1	1	1	1	1	1	1	11
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6	1	1	1	1	1	1	1	1	1	1	1	11
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11	1	1	1	1	1	1	1	1	1	1	1	11
12	1	1	1	1	1	1	1	1	1	1	1	11
13	1	1	1	1	1	1	1	1	1	1	1	11
14	1	1	1	1	1	1	1	1	1	1	1	11
15	1	1	1	1	1	1	1	1	1	1	1	11
16	1	1	1	1	1	1	1	1	1	1	1	11
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24	1	1	1	1	1	1	1	1	1	1	1	11
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47	1	1	1	1	1	1	1	1	1	1	1	11
48	1	1	1	1	1	1	1	1	1	1	0	10
49	1	1	1	1	1	1	1	1	1	1	1	11
sum	48	47	47	47	46	47	48	48	46	48	47	$\sigma = 1.64$
p	0.98	0.96	0.96	0.96	0.94	0.96	0.98	0.98	0.94	0.98	0.96	
q	0.02	0.04	0.04	0.04	0.06	0.04	0.02	0.02	0.06	0.02	0.04	
p*q	0.02	0.04	0.04	0.04	0.06	0.04	0.02	0.02	0.06	0.02	0.04	$\Sigma pq = 0.39$

Table 9 Calculations of the Kuder-Richardson 20 - from MS Exc

Appendix B

	LS	HA	CL	EM	PMS	ISM	PS	ICEMP	CF	PSD	BM	CM	DI	GV	CT	RR	DRI	IR
Leadership	1																	
Human Assets	.19	1																
Culture	.28	.06	1															
Excellence Model	-.04	.10	.44**	1														
Performance Management System	-.14	.36*	.10	.25	1													
Internal Stakeholder Management	.14	.15	.32*	.22	.36*	1												
Policy Strategy	.13	.03	.10	.23	.49**	.33*	1											
Identification of Customer Expectation and Measurement of Perception	-.02	.27	.11	.38**	.46**	.20	.40**	1										
Customer Focus	.09	.18	.24	.33*	.18	-.02	.30*	.47**	1									
Product Service Design	.19	.49**	.34*	.33*	.40**	.54**	.44**	.46**	.39**	1								
Benchmarking	.04	.36*	.16	.31*	.47**	.34*	.50**	.42**	.37**	.57**	1							
Change Management	.01	.24	.12	.20	.11	.21	.27	.22	.24	.24	.39**	1						
Digital Infrastructure	-.12	.38**	.07	.19	.25	.34*	.12	.09	-.08	.47**	.40**	.36*	1					
Governance	.08	.28*	.06	.19	.40**	.60**	.40**	.33*	-.11	.49**	.34*	-.00	.38**	1				
Citizenship Trust	.01	.29*	.09	.08	.43**	.44**	.41**	.40**	.07	.37**	.49**	.40**	.50**	.47**	1			
Rewards Recognitions	-.00	.38**	-.02	.18	.51**	.46**	.49**	.52**	.20	.47**	.54**	.39**	.47**	.41**	.66**	1		
Data Reliability Intelligence	.19	.52**	.03	.22	.49**	.36*	.32*	.40**	.19	.56**	.58**	.19	.49**	.48**	.51**	.61**	1	
Innovation Readiness	.19	.52**	.17	.28	.52**	.45**	.48**	.51**	.38**	.50**	.64**	.32*	.20	.42**	.51**	.57**	.63**	1

*. Correlation is significant at the 0.05 level (2-tailed).
 **. Correlation is significant at the 0.01 level (2-tailed).

Table 10 Correlation Matrix of CSF Items