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Prioritizing the Key Actors of an Organization for Business Excellence Using the Efficient Interpretive Ranking Process

Sumit Kumar* – Pardeep Gupta
Sant Longowal Institute of Engineering & Technology, India

Flexibilities are involved in the process of decision-making. They offer much freedom of choice in terms of the selection of suitable actors who interact with the dynamic environment of the organization. This paper presents a systematic and holistic approach to ranking key actors responsible for the business excellence of an organization. The study highlights the area where the actors of the organization should focus on achieving desired business excellence. It portrays the outcome in the form that top management is the most influential actor since it is responsible for the formulation of the vision/mission of the organization along with the setting of plant quality targets, cost-saving targets, manpower planning, and policy formulation for energy-saving. Top management is followed by cross-function teams (CFTs) and the government of India (GOI) in terms of interaction with the various processes. The novelty of this case study is that it utilizes qualitative and interpretive tools for the analysis, which does not require much statistical knowledge to produce outcomes, and the results are easy to understand. The reported results are in consensus with the results reported by various studies that are conducted using quantitative tools like Analytic Hierarchy Process (AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), total interpretive structural modelling (TISM), etc. that require statistical excellence for the calculation, interpretation, and dissemination of results to the general public and shopfloor employees.
Keywords: flexibility, decision making, situation-actor-process, learning-action-performance, interpretive ranking process, business excellence, top management, Government of India, cross-functional teams

Highlights

- *Adopted qualitative and interpretive SAP-LAP framework of an organization for the identification key actors of the organization.*
- *The adopted methodology is qualitative and interpretive and thus easy to implement and provides understandable results.*
- *The efficient interpretive ranking methodology is intuitive and evolving in nature and can be effective in multiple criteria decision-making.*
- *The depicted methodology is a fully formed tool for shop floor implementation even by the employees without much knowledge about statistical tools.*

0 INTRODUCTION

The business excellence of an organization can be viewed in terms of the achievement of cost competitiveness, increased productivity, the attainment of competitive quality levels, and high customer satisfaction accompanied by good customer loyalty and customer retention. The road to business excellence must involve a systematic approach to make decisions while keeping the freedom of choice in the mind. This makes decision-making a critical core process of any business excellence philosophy. The freedom of choice can be managed by ranking the variables that directly or indirectly affect the process of multi-criteria decision-making. The ranking is often carried out by the researchers and practitioners for prioritizing the variables (e.g., critical success factors, barriers, risk factors, etc.) responsible for the implementation of business excellence philosophies like total quality management (TQM), total productive maintenance (TPM), lean manufacturing, etc. Talib and Rahman [1] proposed a model based on the critical success factors (CSFs) responsible for successfully implementing TQM in the service industry and they ranked the CSFs based on the frequency of their use. In a similar study conducted by Kumar et al. [2], the ranking of the CSFs for implementing TQM in the Indian scenario was done using the technique for order of preference by similarity to ideal solution (TOPSIS) approach. Talib and Rahman [3] adopted the analytic hierarchy process (AHP) approach for ranking the barriers to TQM implementation. Sraun and Singh [4] presented business excellence as a continuous improvement process; there are many strategies for continuous improvement, so the authors ranked the various strategies (TQM, just-in-time (JIT), leadership, TPM, customer relationship (CR), system core work, total employee involvement (TEI), supplier development) for achieving it. The authors ranked total quality management at the top position. Ojha et al. [5] presented their work on the study of the critical factors affecting manufacturing excellence using the interpretive structural modelling technique. Most of the above-mentioned studies ranked the actors that are internal to an organization (e.g., top management support or commitment, employee participation, cross-functional teams, etc.), but these studies failed to address the dynamic contextual

*Corr. Author's Address: Department of Mechanical Engineering: Sant Longowal Institute of Engineering & Technology, Sangrur (PB), India, sumitkumar@sliet.ac.in

relationship that exists between these actors. Similarly, in managing certain issues within the organization, some external actors (e.g., government policies) play an important role, as depicted in a case study carried out in the construction industry by Taofeeq et al. [6] thus, it becomes important for an organization to incorporate the influence of changes in government policies into goal setting process through a forward-looking, anticipatory conceptualization [7]. To reduce the impact of changed government policies, the organization must modify its goal dimensions or its aspiration level [7]; thus, it can be said that the government support moderates significantly among investment strategies, financial knowledge, and organizational profitability, leading towards sustainable development goals [8].

The importance of cross-functional management has been addressed by Witcher and Butterworth [9], whose work was focused on policy deployment through *hoshin kanri* in UK subsidiaries. The authors elevated the importance of cross-functional management in deploying policies for the implementation of TQM and considered policy deployment as a prerequisite for the TQM. Further, Witcher and Chau [10] explored the concepts of policy deployment using balance score card methodology and *hoshin kanri* and found that an organization should consider both its long-term and short-term capabilities along with its core competencies. It was mandated to involve cross-functional management and top executive audits to become a strategically fit organization. In a study carried out to explore the similarities in critical success factors of *hoshin kanri* and quality management, it has been observed that many CSFs of *hoshin kanri* are similar, including top management commitment, cross-functional management, vision, strategies, etc. [11].

The above discussion presents a picture of some of the factors, such as top management, cross-functional management, and government policies, that play crucial roles in deciding the future of business excellence. Therefore, it has become vital to understand the contextual relationship among these actors. The ranking techniques can be broadly classified as quantitative or qualitative techniques. These techniques/tools have their own merits and demerits. The quantitative tools employ a suitable scale for ranking the variables, whereas the qualitative tools employ subjective interpretation by an expert about the variables for ranking, as expressed by Sushil [12]. This paper concentrates on the use of qualitative tools to address system flexibility. Interpretive structural modelling, total interpretive structural modelling, and situation, actor, process-learning, actions, performance, etc., are some qualitative tools used to address the flexibility of the system as expressed by Sushil [13] to [15]. Sushil [13] expressed that the flexibility gaps of a managerial situation can easily be identified using the situation-actor-process - learning-action-performance (SAP-LAP) framework.

A framework based on the SAP-LAP approach has been successfully applied to investigate the supply chain issues by Arshinder [16], Banwet and Pramod [17] and Shukla et al. [18] in various Indian organizations. Further, the SAP-LAP approach has also been adopted to analyse a humanitarian supply chain to reduce the impact of a disaster on human life Lijo [19]. A study was carried out by Kumar et al. [20] to analyse the coal transportation supply chain using the SAP-LAP analysis. Shalender and Singh [21] presented a study in which they assessed the mediating effect of product flexibility on the business excellence of the organization using the SAP-LAP approach. The flexibility issues in the maintenance program for resolving the engineering support issues were studied using the SAP-LAP framework by Garg and Deshmukh [22]. Matharu and Sinha [23] and Palanisamy [24] worked on lean implementation and building information systems for small and medium enterprises using the SAP-LAP framework. The trend in India to determine whether it has enough resources to sustain a growing urban population was analysed using the SAP-LAP framework by Chavan et al. [25]. Sushil [26] expressed variable ranking as a pivoting process of management and decision-making. Sushil [26] also found that most management processes that involve the selection of the variable and decisions about the ranking of these variables are based on subjective evaluation and logic. Interpretive ranking process (IRP) utilizes the interpretive matrix and pair comparison of interpretations as a model base. The above analysis results in the development of a knowledge base. Based on this information, a dominance matrix is prepared. These dominant relationships and interpretations have been shown as an interpretive ranking model [26]. The key success factors involved in the implementation of world-class manufacturing were ranked with the help of an interpretive ranking process; the ranking model was based on the interpretive structural modelling by Haleem et al. [27]. For addressing the complexities involved in the green supply chain, Mangla et al. [28] formulated a generic SAP-LAP model addressing the strategies for reducing the risks involved. The implementation of lean is a difficult task as it has many barriers, so, Zhang et al. [29] adopted an

interpretive ranking process to rank the barriers to the implementation of lean manufacturing. Hughes et al. [30] studied the key factors responsible for the failure of information systems projects. They studied interrelationships between factors responsible for failure using an IRP approach. Narkhede et al. [31] adopted the IRP to rank various criteria and the interaction with the selection process of the third-party logistics service provider (3PLSP). Mhatre et al. [32] carried out the modelling of CSFs involved in construction projects with the help of IRP and system dynamics. Sushil [33] presented an approach named efficient-IRP (eIRP), which reduces the number of paired comparisons thus enabling it to handle a large number of variables. Malik et al. [34] carried out an analysis of the financial inclusion situation in India. The researchers adopted an efficient IRP to rank actors in the Indian economy. Parameswar et al. [35] applied the integrated total interpretive structural modelling-interpretive ranking process (TISM-IRP) approach to study the interaction for the choice of international joint venture firms after their termination. The authors presented the ranking of factors as supplier-buyer, complement, or competitor. Siva Kumar and Anbanandam [36] studied the freight transportation system in India using SAP-LAP and the e-IRP approach; they also suggested a flexible policy framework. The prioritization of actors *viz* top management, generators, retailer, consumers, government policy and regulation, and technology vendors for energy management in a smart grid system was carried out using SAP-LAP methodology by Pal & Shankar [37]. To understand the strategic issues in the integration of Industry 4.0 and the circular economy, a qualitative study has been conducted using the SAP-LAP framework by Chauhan et al. [38]. Further, both SAP-LAP and eIRP techniques have been used to prioritize the stakeholders: government policymakers, industry associations, research and academic institutions, manufacturers, and customers responsible for the implementations of Industry 4.0 [39].

This paper presents a real-life analysis of an organization using the efficient interpretive ranking process (eIRP), which is a novel approach for ranking the factors and is designed to address the limitations of other analytical and quantitative tools, such as the analytic hierarchy process (AHP) and analytic network process (ANP). Unlike AHP and ANP, the eIRP uses an alternate pair-wise comparison methodology to avoid cognitive overload on experts and generate a qualitative interpretation of the rating.

The research was conducted in the following two stages, and this paper presents the second stage.

1. Development of SAP-LAP framework of the organization for the select key business excellence issues [40].
2. Ranking of selected actors of the organization involved in the framework using the eIRP approach.

In this paper, the already developed SAP-LAP framework by Kumar and Gupta [40] has been used for further analysis with the eIRP approach. The novelty of this work lies in its application to rank the actors of a case organization responsible for business excellence. By using the eIRP, we were able to generate an interpretive database that the organization can use for future decision-making. The results of the case study were reported back to the organization.

From the above literature review, it can be established that many studies had been conducted for ranking the actors of the organization using quantitative tools like AHP, TOPSIS, etc., but there is a limited number of studies that uses a qualitative method for ranking the actors of the organization. In this paper, a qualitative ranking approach eIRP is adopted to rank the actors of an organization responsible for business excellence.

1 RESEARCH METHODOLOGY

1.1 Research Context

The study presents results from an in-depth case study of an Indian manufacturing organization: ABC Ltd. Yin [41] had selected a single organization for analysis as it can facilitate an in-depth examination of dynamics that are present in a single and unique real-life setting. This case study can be considered instrumental as it explores an in-depth examination of a particular situation and produces a knowledge base to advance understanding of more generic issues [42]. A single case study can also contribute data to examine theories to capture dynamics and complexities involved in interactions and developments over time that cannot be captured purely by the statistical analysis of any survey [43].

1.2 Data Collection

The qualitative data was collected by conducting semi-structured telephonic interviews with the middle and senior-level employees of the organization based on the SAP-LAP model of inquiry, as shown in Table 1. For the generalization of results, the responses were

also taken from relevant academic experts. All the respondents were informed well in advance through email about the interviews. Table 2 shows information about the number of respondents.

The data for the analysis is collected from the company's annual reports, and business excellence newsletters and, with the help of semi-structured telephone interviews, (qualitative data) were collected from mid- and senior-level practitioners via personal interviews using the SAP-LAP model of inquiry as shown in Table 1.

Table 1. *SAP-LAP model of enquiry*

Element	Queries
Situations	What are the current issues of the organization? What are the performance parameters of the organization? What are the different initiatives adopted to improve the performance of the organization?
Actors	Who are the key actors in resolving the current issues of the organization? Who are the key actors responsible for selecting, monitoring, controlling, and improving the performance parameters?
Processes	What are the processes adopted to improve the current situation? What are the key processes adopted for selecting, monitoring, controlling, and improving the performance parameters? What could be the new key processes through which improvements of performance parameters can be done?
Learning	What are the challenges with reference to the current situation? What are the challenges with reference to various performance parameters? What are the challenges faced by various actors in improving the situations?
Actions	What are the actions that need to be taken to address the issues/challenges of improving the financial and non-financial performance parameters?
Performance parameters	How are the proposed actions going to affect the current scenario for financial parameters? How are the proposed actions going to affect the current scenario for non-financial parameters? What will be the potential impact of the actions on key actors? What will be the potential impact of the actions on various processes?

Table 2. *Experts' domain*

S. no.	Expert domain	No. of experts	Roles
1.	Industry	65	Senior manager (05), Manager (10), Supervisors (50)
2.	Academics	11	Academic researchers

1.3 Error and Biasing Control

The research instrument was meticulously crafted and reviewed by experts to ensure that the questions were simple, clear, non-redundant, and free of bias. Question-ordering bias was addressed by asking first general open-ended questions and then specific questions. To eradicate confirmation bias, the data were analysed by two researchers with an unbiased perspective and followed by sharing the case study reports with the participants [41]. To avoid common method bias, the anonymity of responses was maintained, and participants were protected from evaluation apprehension [44]. Furthermore, any leading, biased, or closed-ended questions were eliminated from the questionnaire to prevent any socially desirable or agreeable responses.

1.4 Data Analysis

The primary data collected through the interview and secondary data collected from the organization's newsletters, annual report, and website were clustered into categories using codes. The discussions in an iterative manner were carried out until both researchers attained consensus.

2 SAP-LAP FRAMEWORK

The organization ABC Ltd. is an Indian automobile manufacturer established in 1994. It manufactures medium-sized and commercial vehicles. The organization is determined to design, develop, manufacture, and market independently its commercial vehicles as per customer needs. The market share of the organization is 31.2 % in medium and heavy commercial vehicles in India in the 2019 fiscal year (FY19). The company registered a revenue of USD 2 billion in FY19. The data analysis begins with the extraction of the information as presented in Table 3. The authors identified the most influential situations in the organization along with the actors that play significant roles in these situations. The authors also identified the process required to make the transformations.

The information learning due to the existence of current situations and processes aids in understanding "why" the current state of the system exists. This further help in the identification of the most probable actions that need to be taken for the improvement of the system in ABC Ltd.

The identified actors have conflicting roles in the identified processes due to the existence of interactions

among them. The SAP-LAP framework provides a holistic way for the identification and resolution of these conflict roles. The conflict in the roles exists in the form of self-interactions (i.e., between the actors) and cross-interactions (i.e., between actors and processes). The self-interaction among the various actors can be envisioned as information, support, teamwork, knowledge sharing, and reporting whereas the cross interactions between the actors and processes can be seen as roles of actors in the currently selected process. The information obtained from the cross-interaction of actors and processes will be utilized for ranking the actors in terms of their dominance in a particular process using eIRP.

Binary and interpretive matrices were used to present the interactions between actors and processes. The selected actors and processes are defined in the following section.

Table 3. *Elements of SAP-LAP framework*

Components	Elements
Situations	SN1: High inflation
	SN2: High power cost
	SN3: Old machines and plant
	SN4: Wide range of product
	SN5: High manpower cost
Actors	ACT1: Government of India
	ACT2: Top management
	ACT3: Cross-functional Teams
Processes	PR1: Strategic Planning
	PR2: Quality assurance (QA)
	PR3: Cost management (CM)
	PR4: Human resource management (HRM)
	PR5: Energy management
Learnings	LN1: Global vision of the organization
	LN2: Technology up-gradation
	LN3: MUDA reduction program
	LN4: Capacity enhancement/Efficiency improvement
	LN5: Liaison with alternate energy resources
Actions	ACN1: Energy policy as a core objective
	ACN2: Maintenance policy
	ACN3: Technology Management
	ACN4: Use of IT in cost management
Performance	PP1: Productivity improvement
	PP2: Quality improvement
	PP3: Power consumption reduction
	PP4: Total conversion cost reduction

2.1 Defining Actors and Processes

Actors (ACTs): Actors of an SAP-LAP framework are the elements that deal with the current prevailing situation in an organization; these can be in the form of customers, suppliers, top management, employees, etc. The identified actors are defined below. These actors can be external or internal to an organization.

Actor 1 (ACT1): **Government of India (GoI)**: The government of the country policies and these policies directly and indirectly the performance of an organization (e.g., a fiscal policy can directly affect the profits margins of an organization). In the present case study, it has been seen that inflation is a serious issue for the case organization and thus it needs to take suitable actions to counter it.

Actor 2 (ACT2): **Top management:** In any organization the top management plays a pivotal role in crafting strategies and business objectives. It is also responsible for resource allocation and taking decisions are per the requirements. Most of the time, it is seen that the top management needs to communicate with the government for the formulation of policies as per its requirement.

Actor 3 (ACT3): **Cross-functional teams (CFTs):** Cross-functional management involves persons of varied expertise to solve common issues that gave cross-linkages. Most of the issues in the case organization were found of multiple cross interactions so CFTs is selected as an actor for achieving key management indices (KMIs) or business goals by establishing relative key performance indices (KPIs) and key activity indices. The annual objectives of the organization are managed through various CFM teams. The CFM teams are led by a senior leader of the plant with members selected from various departments. The employees of the organization are included in the CFM while doing the analysis.

Processes (PRs): The processes are transformational activities. The actors are involved in these activities for doing the transformations. These may represent supply chain management, outsourcing, production, and core competence building. The identified processes are defined below.

Process 1 (PR1): **Strategic planning (SP)**: Strategic planning in an organization is the foundation of its excellence. It is responsible for establishing the performance parameters along with their measurement.

Process 2 (PR2): **Quality assurance (QA)**: Quality assurance (QA) in the organization is responsible for achieving competitive quality levels. It also ensures the establishment of a quality culture from supplier to end customer. The case organization was witnessing several quality issues due to increased manufacturing complexity.

Process 3 (PR3): **Cost management (CM)**: Cost is a principal concern of every organization and needs

to be managed for optimizing the cost of end products. With twenty-year-old plants, the organization was dealing with aging assets burdened with production load. This posed threats in terms of delivering end products at a competitive price in the market.

Process 4 (PR4): **Human resource management (HRM)**: HRM is selected as a process in this case study as it is responsible for the roles and responsibility distribution, employee skill development, training, rewards, recognition, etc. HRM in this organization played a striking role by contributing to increasing human productivity through total employee involvement.

Process 5 (PR5): **Energy management (EM)**: from the secondary data, it was observed that the energy cost for the plant was on the higher side. This issue can be addressed in cost management, but there were some issues regarding the source of electricity, so it was decided to take up this as a new management approach.

3 EFFICIENT INTERPRETIVE RANKING PROCESS (eIRP)

The various steps involved in the interpretive ranking process are listed below **[26]**.

1. Identification of ranking variables (X) and reference variables (Y).
2. Clarification of the contextual relationship between ranking and reference variables.
3. Identification of interactions of ranking variables (X) with reference variables (Y).
4. Development of interpretive matrix interpretation with the help of interaction matrix.
5. Pairwise comparison of ranking variables interactions with reference to variables to identify dominance matrix (interpretive logic – knowledge base-dominance interaction matrix).
6. Summary of the count of dominant interactions (with/without) weightage to the reference variables and computation of ranks (dominance matrix).
7. Validation of ranks: internal validity; cross validity; sensitivity analysis.
8. Graphical representation of ranks.
9. The decision about ranks and suggested actions.
10. Creation of knowledgebase.

3.1 Establishing Contextual Relationships between Ranking and Reference Variables

In the present case, the identified actors of the organization (i.e., ACT1: GoI, ACT2: Top management, and ACT3: CFTs) are the ranking variables, and they are ranked with reference to variables (i.e., processes). The contextual relationship between the various ranking variables and reference variables in binary and interpretive form is presented in Tables 4 and 5, respectively.

Table 4. *Cross-interaction matrix for actors and processes-Binary matrix*

	Actors					
External	ACT1	1	0	0	0	0
Internal	ACT2	1	1	1	1	1
	ACT3	1	1	1	1	0
	Process	PR1	PR2	PR3	PR4	PR5
		Internal				External

3.2 Dominance Matrix: Paired-Wise Comparison

The interpretive matrix as shown in Table 5 is used as a base to do a pair-wise comparison of ranking variables with reference to variables (i.e., actor ACT1 and ACT2 are compared for the various processes mentioned above). The outcome of this comparison is the interpretive logic of dominant interactions that exist among the actors for various processes. This interpretive dominance knowledge base is presented in Table 6.

From the information present in Tables 4 to 6, it can be seen that ACT 1: GoI interacts with other others only for processes PR1: Strategic planning as the

Table 5. *Cross-interaction matrix for actors and processes-Interpretive matrix*

	Actors					
External	ACT1	Economic policy formulators	-	-	-	-
Internal	ACT2	Vision and plant objectives	Plant quality targets	Cost-saving targets	Manpower planning	Energy-saving project coordinator
	ACT3	Key performance indicators	Quality improvement	Plant cost reduction	Skill improvement	-
	Process	PR1	PR2	PR3	PR4	PR5
		Internal				External

Table 6. *Paired comparison with interpretations of ranking of actors with reference to processes*

Paired comparison	Interaction with process	Interpretive logic
ACT1-ACT2	PR1	Formulation of economic policy and its inclusion in vision and mission statements is a must
	PR2, PR3, PR4, and PR5	ACT1 no direct role
ACT1-ACT3	PR1	The economic policies of GOI should drive the KPIs
	PR2, PR3, PR4, and PR5	ACT3 no direct role
ACT2-ACT1	PR2, PR3, PR4, and PR5	ACT1 no direct role
ACT2-ACT3	PR1	Vision statement & Plant objective should drive the KPIs
	PR2	The quality policy of the plant should drive the quality improvement projects
	PR3	The cost-saving targets should drive the plant cost-reduction projects
	PR4	Manpower planning should consider the skill improvement of employees
	PR5	ACT3 no direct role
ACT3-ACT1	PR2, PR3, PR4, and PR5	ACT1 no direct role
ACT3-ACT2	PR5	ACT3 no direct role

Table 7. *Dominating Interaction matrix- ranking of actors with reference to processes*

		Dominating		
		ACT1	ACT2	ACT3
Being dominated	ACT1	-	PR1	PR1
	ACT2	PR2, PR3, PR4, and PR5	-	PR1, PR2, PR3, PR4, and PR5
	ACT3	PR2, PR3, PR4, and PR5	-	-

organization's economic policies will be governed by the fiscal policies of the Indian government. Similarly, it can also be seen that for process PR5: Energy management, ACT2: Top management dominates the other two actors as top management is responsible for policy making. Table 7 shows the dominance of various actors against the selected processes in a concise manner.

3.3 Identification of Types of Dominance Interaction

After establishing this information, the next step is determining the type of dominance and for this, the adopted procedure is stated below.

The dominance interaction of one alternative (*m*) over the other alternative (*n*) for a criterion can be identified as follows from a binary cross-interaction matrix.

Implicit dominance: This type of dominance interaction occurs when an alternative (m*)* has a relationship whereas alternative (*n*) has no relationship: (1) and (0) in the binary matrix for a positive criterion, then the alternative (*m*) implicitly dominates the alternative (*n*) for the positive criterion and vice versa in case of negative criterion.

Implicit non-dominance: This type of dominance occurs if both (*m*) and (*n*) cells have no relationship: (0) in the binary matrix. This can also happen if both the (*m*) and (*n*) cells have a relationship: (1) in the binary matrix and the interpretations for both the factors are same in the (*m*) and (*n*) cells then there exists implicit non-dominance and then enter (0) in in the *m–n* cell.

Interpretive dominance: when both the (*m*) and (*n*) cells have a relationship (1) but their interpretations are different in both the cells, then the dominance relationship is decided by an external expert with proper justification.

Transitive dominance: This type of dominance occurs when there are entries (1) in more than two cells for a criterion but with different interpretations. Then if *m–n* is a dominant interaction, (*n–k*) and (*m–k*) will be transitive dominance. Table 8 shows the contribution of various types of dominance

Table 8. *Various dominance comparisons for actor x process*

Reference variables	Implicit dominance	Implicit non-dominance	Transitive dominance	Interpretive dominance	Total comparison	% Interpretive comparison
PR1	0	0	0	3	3	100
PR2	2	0	0	1	3	33.33
PR3	2	0	0	1	3	33.33
PR4	2	0	0	1	3	33.33
PR5	2	1	0	0	3	0.00
Total	8	1	0	6	15	
Percentage	53.33	6.66	0.00	53.33		

interactions in the system and it can be seen that there is no transitive dominance in the system.

For better visualization of these interactions in the various process, individual matrices for the process can be drawn as shown in Fig. 1a to e. Fig. 1 shows the type of dominance for various actors in a color-coded scheme per scheme shown in Fig. 1f.

3.4 Ranking of Actors

To rank the actors the steps mentioned in Section 3.3 were repeated obtaining the dominating interactions for the remaining process. for calculating the ranks of the actors following steps are adopted.

1. The overall dominance matrix was calculated by summing all possible dominance interactions.
2. Calculate, the number of all paired comparisons with their respective percentages.
3. Calculate the rank of a factor based on the dominance index equation, Eq. (1) [45].

$$DI_x = \frac{AND_x}{Total\ interation\ (TI)} \times 100. \quad (1)$$

Based on the above index, the ranks of variables are calculated and shown in Table 9. Fig. 2 shows the interpretive ranking model of actors for various processes.

4 RESULTS AND DISCUSSIONS

From the information presented in Table 9, it can be seen that the top management is the top-ranked actor among the others in an organization as this actor holds the responsibility for the formulation of policies related to aspects like quality, cost, and energy [1] to [4]. Also, it can be seen that the government of India

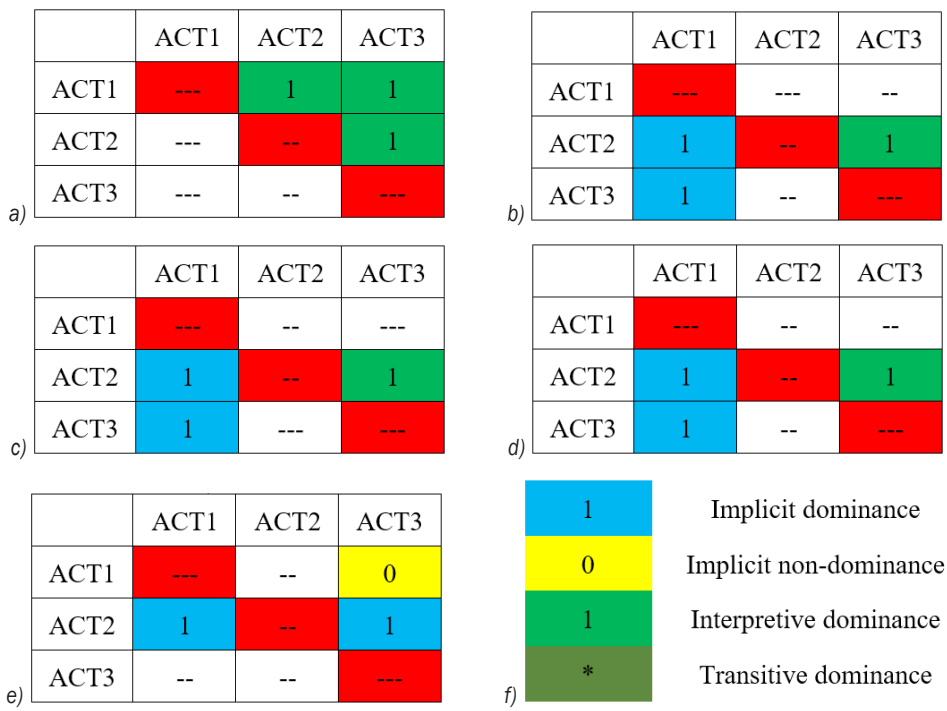

Fig. 1. *Dominance of actors for various processes; a) PR1, b) PR2, a) PR3, a) PR4, a) PR5, and color-coding scheme for various dominances*

Table 9. *Dominance matrix- for ranking of actors w.r.t process*

	ACT1	ACT2	ACT3	No. of dominating (D)	Balance dominance (D-B)	Adjusted net dominance (AND)	Dominance index (DI)	Rank dominating
ACT1	---	1	1	2	-6	0	00	III
ACT2	4	--	5	9	8	14	93.33	I
ACT3	4	0	---	4	-2	4	26.66	II
No. of being dominated (B)	8	1	6	15 Total interactions				

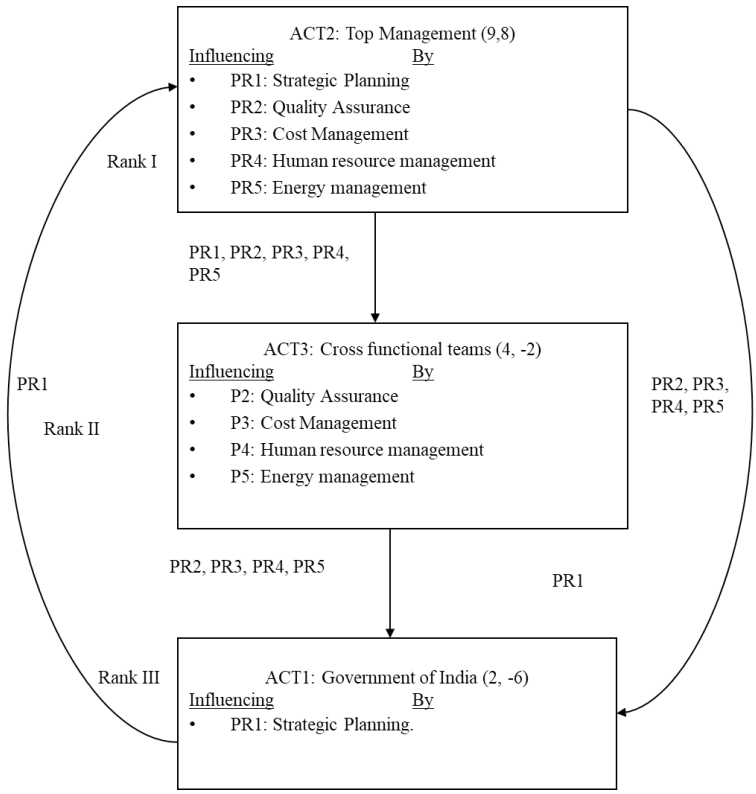

Fig. 2. *Interpretive ranking model for actors with regard to processes*

is the only actor that interacts with top management and the interaction happens only in the process of strategic planning where top management design its economic policies based on the economic policies of the government.

CFTs handle the issues of cross-functional management, which directly contributes to the deployment of the strategic policies formulated by top management. CFTs under cross-functional management deploy, monitor, and review the KPIs and KMIs. The importance of CFTs in an organization had been reported in several studies **[9]** to **[11]**. Therefore, the present study offers the following propositions.

Proposition 1: To curtail the situation of high inflation, the top management should frame its policies as per the fiscal policies of the government of India.

Proposition 2: To minimize the high cost of power, the top management should frame its energy policy focusing on the purchase of energy from renewable resources, cutting dependencies on diesel generators, etc.

Proposition 3a: To handle the cost of maintaining old plants and machinery, the top management should include a maintenance policy as its core policy.

Proposition 3b: The purchase of new machines to replace old low-energy-efficiency machines through cross-functional teams, which will be responsible for the achievement of associated key performance and key management indices.

Proposition 4: To produce a wide range of products, the top management should adopt a policy on manufacturing flexibilities in its core policies and implement these policies through CFTs. The CFTs will handle the KPIs and KMIs for the quality, cost, and delivery.

Proposition 5: For managing the issues related to manpower, the top management should design strategic objectives and process them through the process of human resource management.

5 VALIDATIONS OF THE RANKING MODEL

The ranking model can be validated through the internal validity of pair-wise comparison of actors (A_m – A_n) through dominance system graphs for various processes (P_i). At the very first stage, the ranking model can be validated by making certain that the net sum of all the net dominances is zero **[26]**. Secondly, by drawing system dominance digraphs as shown in

Fig. 3 and ensuring that there should not be a feedback loop in the digraphs as the feedback loop does not indicate clear dominance relationships. The actual validation of the model can only be done by adopting the model on the shop floor.

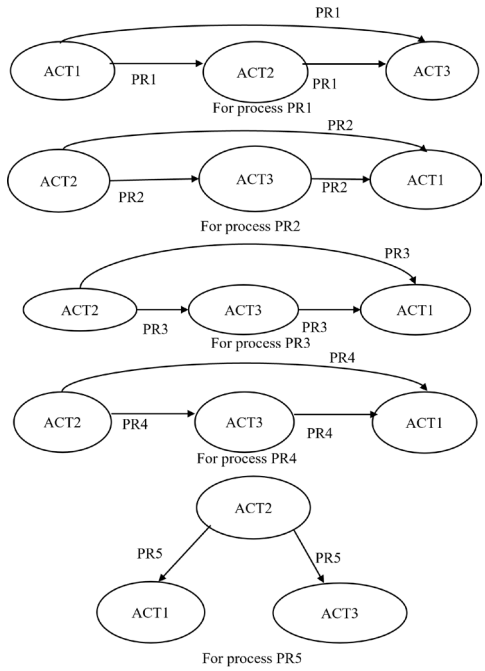

Fig. 3. *Internal validation of the ranking model*

6 CONCLUSIONS AND PRACTICAL IMPLICATIONS

This study utilizes the SAP-LAP framework developed by Kumar and Gupta **[40]** in building the interpretive knowledge base and in the ranking of the elements of the framework through the eIRP approach. The framework explores the freedom of choice available during the selection of the factors. The study helped in building the contextual relationships among the various elements of the framework portraying the interactions among the constituents of an organization. With the help of the efficient interpretive ranking methodology, it has been concluded that the top management is the most catalytical actor among the others and is responsible for initial push, motivation, budget allocation, etc. required for sustainable business excellence.

In contrast, the cross-functional teams are the torchbearers of the organization that are designed to resolve cross-dimensional issues. These are very much responsible for the successful implementation of total quality management **[46]** and other business excellence philosophies, such as TPM, six sigma, lean manufacturing, etc.

The third most influential actor in the case study is the government of India, which is responsible for framing the fiscal policies and these policies have an impact on the financial targets of the organization. The ranking obtained in the paper and the procedure adopted for the exploration of freedom of choice in decision-making may help organizations in similar situations. This study portrays an overall picture of the various situations present in the organization in an interpretive and organized manner and the ranks obtained through an efficient Interpretive Ranking Process.

The results reported in this work are consistent with the results reported by adopting both quantitative and qualitative techniques, such as AHP **[3]** and interpretative structural modelling (ISM) **[27]**. Talib and Rahman **[3]** reported the lack of top management commitment as a critical barrier to the implementation of TQM in an organization this result agrees with the result reported in the present study that top management is the top-ranked actor in the case organization which is responsible for policy management, budget allocation, and motivation behind carrying the activities responsible for the business excellence of the organization. Talib and Rahman **[3]** also reported the lack of coordination in the departments as a critical barrier that prevents the implementation of TQM; in the present case study, cross-functional management emerged as the second most critical actor responsible for the implementation, monitoring, and review of the KPIs applicable for cross-dimensional activities. The results reported in the present study are supported by the interpretive knowledge base which was not available in the previous studies.

Haleem et al. **[27]** adopted both ISM and IRP approaches for ranking the critical success factors responsible for the implementation of world-class manufacturing. The ISM model reported top management as the key driving factor, whereas with the IRP the authors reported a reduction in energy consumption and waste minimization as the key driving factors responsible for the implementation of world-class manufacturing. This leads to the conclusion that IRP calls for more information and yields better qualitative and realistic results than ISM.

In this paper, an efficient version of IRP has been adopted to capture and display the results in an informative manner. The results of this study are similar in a broader perspective but differ in descriptive nature from previously reported studies.

Kumar et al. **[2]** surveyed the TQM critical success factors in north Indian manufacturing industries

and reported that top management commitment and teamwork as a few critical success factors among others that support the implementation of TQM. The study reported that top management supports the TQM by communicating and explaining quality goals and policies to the employees of companies. In the present study, the role of top management is depicted in a much broader sense by portraying its interactions with the other actors of the organization.

Overall, this study contributes to the field by introducing the eIRP, a novel approach for ranking factors that provides a qualitative interpretation of the ratings. The eIRP has the potential to be applied to various decision-making problems in different contexts and can provide valuable insights for managers and decision-makers to improve organizational performance. The results of the case study demonstrate the practical application of the eIRP and highlight its potential to support organizations in achieving business excellence.

Furthermore, the study offers practical implications in the following manner.

1. The key actors and their interactive roles are critical to an organization and these interactions can be foreseen by the managers with the help of the SAP-LAP process.
2. The inherent flexibilities or freedom of choice in the form of interactions will be available as a knowledge base. This knowledge base can further be utilized to rank the factors of interest against a particular criterion.
3. The methodology strengthens decision-making in any managerial context.

7 LIMITATIONS OF THE STUDY AND FUTURE SCOPE

The work undertaken in this study has some limitations since it offers a theoretical framework based on the opinions or judgment of the expert. The subjective nature of the judgment makes the interpretive linkages volatile. However, this volatility is reduced when the weights among the opinions/judgments are very large. The results posted in the study can be tested and validated only when applied in a real situation.

This study also has some limitations as it is based on the situations found in a single organization. Therefore, the results might differ when the model is applied to another organization that has some different situations. For the generalization of the results, more empirical data should be gathered. Also, the model should be redesigned before implementing it in different scenarios. Some algorithms may be developed for carrying out interpretive paired comparisons among the variables, which can help in addressing a large number of variables.

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