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Case Study on Business Excellence Issues of an Indian Automobile Manufacturer using SAP-LAP Framework

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ABSTRACT: The business excellence of any organization is governed by many factors. The management decisions are responsible for the control of these factors, and thus these decisions are of prime importance. This paper investigates the issues affecting the business excellence of an Indian automobile manufacturer. The organization ABC limited is an Indian automobile manufacturer producing medium and heavy commercial vehicles. The main aim of this study is to propose an interpretive framework that will help in multi-criteria decision making. Therefore, the present study uses an interpretive method, namely ''situation–actor–process–learning– action–performance'' (SAP–LAP) analysis, to enhance the understanding and analyze the business excellence issues in ABC ltd. The organization was facing some issues in achieving business excellence. SAP-LAP framework methodology has been adopted by the authors for analyzing managerial context to aid up the management decision making.The major challenge towards implementing the SAP-LAP approach is its interpretive nature which is judgmental and highly subjective nature.The organization is analyzed for situation-actor-process. Based on SAP analysis, some learning issues* are identified, actions* are suggested with a proposed set of performance* parameters. For the SAP analysis, the data is collected from the organizational reports, newsletters, success stories, etc. Oral discussions are also carried out with some of the managers of the organization. The findings of the study revealed several issues like the need for formulation of energy liaison policy, focused maintenance approach with adoption of technology management, and use of IT in for cost management.The authors also propose a theoretical LAP framework for the organization.

Keywords: Business excellence, SAP-LAP Framework model, decision making, Performance measures.

I. INTRODUCTION

The philosophy of think local-act global is the main motivating force for the many Indian organizations to show their presence in the international market. Similarly, many foreign organizations leveling their playfield in India. In both cases, the Indian firms need to tight up their socks and be ready for a globally competitive environment. In this hurried situation, managerial decision making plays a vital role. Flexible systems management plays a pivotal role in managerial decision making by addressing the flexibility of the system. SAP-LAP framework [1-3] provides a model of inquiry for addressing issues in the managerial context. The flexible model of SAP-LAP presents the situation of coordination to participants who may initiate the processes needed to be coordinated. It also helps in identifying flexibility gaps in adoption of coordination mechanisms. The synthesis of SAP leads to LAP, which bridges the gap of flexibility by suggesting improvement actions on the gaps of flexibility or the learning from the present situation, actors, and processes [4]. The SAP LAP framework was utilized to study organizational sociotechnical systems to find a solution to the problem of managerial turnover [5]. It is also applied to study the effects of strategic change management involving activities like safety, health, environment on the employees' performance [6]. The various issues of strategic technology management of the automobile industry were also addressed by this methodology [7]. It has also been implemented for resolving the issues in the areas of supplying chain coordination and in the area of disaster management for in the analysis of humanitarian supply chain management concerning the flow of aid materials, information and services to reduce disaster to human life [8], [9]. In the case of the automobile industry, this methodology was adopted to resolve the qualitative and quantitative issues in the supply chain [10]. In a small-medium enterprise, it was implemented for a building information system for business excellence [11]. It is also finds applied to assess the lean implementation journey of an automobile component manufacturing company along with the identification of areas of the future scope for improving lean manufacturing [12]. It helped in assessing the overall role of product flexibility in providing sustainable growth to the organization [13]. Due to the generic nature of the approach, it was utilized for analyzing the sourcing process in an apparel manufacturing company and helped in the identification of the critical drivers for efficient sourcing practices [14]. Interestingly, it was also adopted to carry out the analysis for maiden modal shift and coal transportation supply chain [15]. In one case study, this methodology was adopted for the analysis of the financial situation in India along with the identification of the gaps and suggested actions to bridge these gaps[16]. SAP-LAP methodology was used to measure service quality being imparted by a well-established group of technical

institutions located in North India. The analysis identified six service quality factors i.e. leadership, process management, people management, resource management customer satisfaction, and customization that influences the performance parameters of the organization in terms of placements, reputation, growth, and sustainability of such institutions [17]. The trend of urbanization in India to determine whether India, with its prevailing urban physical infrastructure, bottlenecks, and targeted policies are equipped enough to sustain a growing urban population was studied using SAP-LAP framework [18]. The lean implementation approach in Indian MSME was also studied using the SAP-LAP framework [19]. [20] presented the case study on building the supply chain resilience of an organization by using SAP-LAP framework.[21]presented a case study of India retail industry, the authors analyzed the issues of inventory coordination mechanism in the supply chain (SC) using SAP-LAP framework. [22] applied the SAP-LAP framework for analyzing the multimodal Freight Transportation System of India. The authors further used this framework to rank to actors of the study w.r.t to processes and actions w.r.t to performance. In another application, the role of flexibility in sustaining the excellence in an organization was studied using the SAP-LAP framework [23].

The above brief literature presents the picture of the wide domain of the applicability of the SAP-LAP framework. The transaction-cost theory suggests that there exists a relationship between costs associated and market transactions and pointed out that for an organization to prosper it is a must-have cost advantage [24]. The perceived cost advantages for an organization can be seen as the financial performance of the organization and according to [25] customer perspective caters most influence on the financial performance of an organization. The organizations that foster very strong customer orientation were found to be more successful in implementing quality initiatives in their market of interest [26]. The cost of quality and Unit production costs are some essential performance measures that are greatly influenced by the implementation of a quality management system [27]. Many organizations tried the integrated implementation of TPM and TQM and observed that there is an appreciable increase in the business performance of the organization over some time [28]. Productivity is one of the prime measures of the operational performance of an organization can be directly correlated with the productivity of the employee. TQM in an organization creates a motivating culture that promotes the employee and thus becomes a driving force that helps in the increases in productivity [29]. There is a great affinity between the leadership style and the implementation of TQM in an organization [30]. But The positive effect of the visionary leadership on the firm performance of the organization can be seen only when the firm size is controlled [31]. Some critical success factors are responsible for the successful implementation of TQM in an organization [32]. The contribution of innovation and continuous improvement approach in an organization can be seen as a catalyst for the successful implementation of TQM and thus these help in harnessing significant improvements in quality, productivity, cost, safety, and delivery [33]. On the other hand, the contribution of TPM can be seen in terms of benefits to operational performance of the plant also it significantly helps TQM to achieve operational effectiveness, by mitigating the cost of quality in terms of reduced scrap and reduced defective products [34, 37]. In a TQM based case study conducted on hospitals, it has been revealed that people management, process management, and information and analysis contribute towards the enhancement of the operational performance of the organization [38]. So, it can be argued that TQM should be considered as a dynamic resource, capable of driving the organization towards competitive advantage [39]. But there is an active role of senior management in the implementation of TQM in award-winning organizations whereas the non-award-winning organizations are plagued with less motivated senior management towards the implementation of TQM [40]. Quality tools act only as a vehicle for quality improvement so these tools alone cannot lead towards continuous process improvement and customer satisfaction [41]. In achieving manufacturing excellence, the operational cost reduction approach plays an important role [42]. Being one of the major components of the operational cost, Energy can be considered as a strategic input required for the development of any society as well as economic policy and its role become more prominent when energy accounts for one-third of the product cost [43]. Organizations can be more competitive by presenting the products at a lower price. A performance management model developed based on employee performance can be used as a business excellence model [44].

There are many researchers have analyzed the problems of the business excellence of the organizations using the quantitative approach. Few researchers contributed towards the empirical studies using the qualitative methods like SAP-LAP framework. This study evaluates the business002 excellence issues of the organization like cost management, energy issues, etc. qualitatively. These issues were addressed by authors quantitively but very few have worked. Most multicriteria decision making (MCDM) applies a quantitative approach to employing a scale. The scaling of the scoring method is questionable and at times it is difficult to score on the scale, this limitation of the quantitative approach has been overcome by the qualitative SAP-LAP approach.

In this case study, the business excellence performance of the organization is evaluated using SAP-LAP framework analysis. The data for the analysis is collected from the annual reports, awards report available on the organization website. The collected data is analyzed for *Situation, Actor, and Process,*and based on this analysis suggested *Learnings**, *Actions*, and Suggested Performance* parameters* are reported.

II. ABOUT THE ORGANIZATION

The organization ABC Ltd. (name changed to protect privacy) is an Indian automobile manufacturer since 1994. It manufactures medium and commercial vehicles. It is also one of the key participants and drivers of the Indian economy, with a market share of 30%. It provides bread and butter to 7000 employees. The organization has continuously and consistently pioneered the introduction of new technologies and innovative products into Indian as well as other markets.

The organization is determined to become a fully independent manufacturer with the ability to design, develop, manufacture, and market all range of its commercial vehicle and continuously upgrade its capability to meet customer needs. The name of the organization is changed to keep the anonymity of the organization.

III. CASE STUDY

This case study presents the SAP-LAP framework for ABC ltd. for the analysis of certain managerial issues for the attainment of business goals. The framework was developed by analyzing the organizational reports, success stories, and conducting oral discussions with some of the managerial level staff.The current situation of the organization is assessed for situations (S), actors (A), and process (P). The assessed information for situations (S), actors (A), and Process (P) is presented below.

A. Situation-Actor-Process (SAP) element identification, selection, and definition

The SAP analysis for the organization begins with the identification of the SAP elements. The SAP elements are identified from the reports of the organization available at the organization's web portal and with thorough discussions with managerial staff. The following are the identified SAP elements.

Situation(S): The Situation (S) element of the SAP analysis represents the business conditions of the organization at a time. The situation can be external or internal to the organization. It may represent competition, market growth, core competence, market share, etc. The following situations are identified from the available organizational literature.

Situation 1 (S1): High inflation. The first situation for the organization was high inflation due to the falling value of Indian currency in the international market. This condition was considered external to the organization since the organization does not have direct control over it. This situation finds its place in the analysis since it was impacting the financial condition or, in turn, the business performance of the organization.

Situation 2 (S2): High power cost. The second situation identified was a high-power cost. This situation was selected because the organization was located in such a place in India where the electric supply was not regular also, the price of the electric power per unit was riding a skyrocket. This condition posed a situation that the organization was needed to overcome to reduce total conversion cost along with environment saving.

Situation 3 (S3): Old machines and plants. The organization's plant was established in 1994, and some of its machines were shifted from other plants when this plant was commissioned. Working with old machines in an old plant created another volatile condition where the organization needed to upgrade itself, along with having various maintenance issues.

Situation 4 (S4): Wide range of product. The organization was producing commercial vehicles in light to heavy range along with various models in each category. This situation desired the plant to be flexible enough to deal with the continuously varying demands of the customer in response to number and design.

Situation 5 (S5): High manpower cost. Due to business consolidation in 2010, a handsome number of permanent manpower was transferred from a different plant to this plant. The condition becomes much worse as the wage revision and welfare activities put more pressure in terms of expenditure on this plant.

Actors (A)

The actors in SAP represent elements that deal with situations. These elements can be external or internal to the organization. These may represent customers, suppliers, top management, employees, etc. Following actors are identified

Actor 1 (A1): Government of India. This actor is identified and selected in the case study since it controls the situation of high inflation and high-power price.

Actor 2 (A2): Top management. The Top management of the organization was responsible for the strategy and business objective formulation, along with resource allocation. The organization needed to cope with the Indian government policies to turn odds in favor of them.

Actor 3 (A3): Cross-functional management. Cross-functional management plays a vital role in achieving key management indices (KMIs) or business goals by establishing relative key performance indices (KPIs) and key activity indices (KAIs). 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 analysis.

Process (P)

The actor's response to a situation is referred to as a process. In a similar manner to the situation and actor, the process can be external or internal. Process (P) may represent supply chain management, outsourcing, production, core competence building. The following elements are selected as a process.

Process 1 (P1): Strategic planning. Strategic planning plays an important role and acts as a guideline towards the achievement of business objectives.

Process 2 (P2): Quality assurance (QA). Quality assurance (QA) of the organization is needed to achieve competitive quality levels. Since the organization was producing a range of products with model variation, the strict quality expectation was desired due to increased manufacturing complexity.

Process 3(P3): Cost management (CM). The organization with more than two-decade-old plants was dealing with depreciated assets along with producing a wide range of products in varying volumes. Delivering these products at a competitive price in the market can only be possible by managing the cost.

Process 4 (P4): Human resource management (HRM). The HRM is selected as a process since it directly deals with employees. Employee skill development, rewards, recognition, etc. are some of the functions of HRM. HRM in this organization played a striking role by contributing to increase human productivity.

Process 5 (P5): Energy management. The critical situation of the power-hungry plant mixed with high energy cost along with a non-consistent power supply was to be addressed by energy management.

B. SAP framework analysis

The SAP framework comprises of self-interaction and cross interaction in both binary and interpretive form. The following selection presents all basic self-interaction and cross interaction matrices, which helps in theory building for further LAP synthesis.

Self-interaction matrix. The Self-interaction matrix presents the relationship between the elements of a category or group. They present the interdependence of the element in question with the other elements. A paired comparison in binary form (1, 0) made where 1 shows the existence of a definite relationship, and 0 shows the absence of the relationship. The flowing table shows some of the possible types of relationships that can exist in the self-interaction matrix.

Table 1: Possible interpretive relationship in Self interaction matrix.

SAP elements	Interpretive relationship
Situation	Adds to uncertainty, contribution, influences, multiplier effects
Actor	Information, support, teamwork, knowledge sharing, reporting
Process	Physical flow, information flow, people flow, order flow, money flow

Self-interaction matrix for Situation (S). The self-interaction matrix for the situation is shown the Table and Table 3, 2 shows the binary form of the matrix, whereas Table **1** shows the interpretative form of the matrix. This matrix provides information in the sense of whether each situation is linked with other situations or not.

Table 2: Binary Self-Interaction matrix for Situation (S).

Internal			External	
1	0	0	1	S1
0	0	0	S2	
0	1	S3		
0	S4			
S5				

Table 1: Interpretative Self-Interaction matrix for Situation (S).

Internal			External	
Increased daily wages/allowances	—	—	The high cost of power units	S1
—	—	—	S2	
—	Seeks high manufacturing flexibility	S3		
------	S4			
S5				

Self-interaction matrix for Actor (A). This matrix helped in the understanding of the relationship between the various roles of the actors in or out of the organization. Table 4 and Table 5 shows the self-interaction matrix for actor in binary as well as interpretive form respectively. This matrix helps in gathering information on whether the actions of these actors are linked with each other or not.

Table 2: Binary Self-interaction matrix for Actor (A)

Internal		External
0	1	A1
1	A2	
A3		

Table 5: Interpretive Self-interaction matrix for Actor (A) in.

Internal		External
—	Economic Policies	A1
Vision & strategies	A2	
A3		

Self-interaction matrix for Process (P). This matrix helped in the understanding of the relationship between the various process in or out of the organization. Table 6 and Table 7 show the self-interaction matrix for process in binary and interpretive form, respectively. This matrix gives information about whether each process adds to another or not.

Table 6: Binary Self-interaction matrix for Process (P).

B				External
1	0	0	0	P5
0	1	1	P4	
1	1	P3		
0	P2			
P1				

Table 7: Interpretive Self-interaction matrix for Process (P).

Internal				External
Optimum of energy utilization	—	—	—	P5
—	Better cost management	Better resource utilization	P4	
Optimum of energy utilization	Provision of new technology	P3		
-----	P2			
P1				

Basic Cross interaction matrix: The basic cross-interaction matrix represents the relationship between the elements of two different groups or categories like situation and actors, and so on. In a similar manner to self-interactive matrices, these relationships are expressed in binary (1, 0) as well as interpretive form. Some of the possible interpretive relationships in the cross-interaction matrix are presented in the following table.

Table 8: Possible interpretive relationship in the cross-interaction matrix.

SAP elements in paired comparison	Interpretive relationship
Situation-Actor	Situation influencing actors, constraints to act
Actor-Process	Roles of actors in the selected process
Process-Situation	The response of process in selected situation

Cross interaction matrix for Situation X Actor. The cross-interaction matrix for the Situation x Actor presents the understanding of the influence of the situation on actors. The following Table 9 and 10 presents the cross-interaction matrices.

Table 9: Binary Cross interaction matrix for Situation X Actor.

	Situation			
External	S1	1	1	0
	S2	1	1	0
	S3	0	1	0
Internal	S4	0	1	1
	S5	0	1	1
	Actor	A1	A2	A3
		External	Internal	

Table 10: Interpretive Cross interaction matrix for Situation X Actor.

Situation			
S1	challenging environment	Strategic planning	—
S2	Promotes energy saving	Forces energy minimization	—
S3	—	Optimum Energy utilization	—
S4	—	Infrastructure expansion	Maintenance Policy
S5	—	Optimum use of Manpower	Role-based competency enhancement
Actor	A1	A2	A3
	External	Internal	

Cross interaction matrix for (Actor X Process). The cross-interaction matrix for actor and process is shown in Table 11 and Table 12 in binary and interpretive form, respectively. This matrix helps in the identification of the role of the actor in the selected process if it exists.

Table 11: Binary Cross interaction matrix for (Actor X Process).

	Actors					
External	A1	1	0	0	0	0
Internal	A2	1	1	1	1	1
	A3	1	1	1	1	0
	Process	P1	P2	P3	P4	P5
		Internal				External

Table 12: Interpretive Cross interaction matrix for (Actor X Process).

Actors					
A1	Economic policy formulators	—	—	—	—
A2	Vision and Plant objectives	Plant Quality targets	Cost-saving targets	Manpower planning	Energy-saving project coordinator
A3	Key Performance Indicators	Quality improvement	Plant cost reduction	Skill improvement	—
Process	P1	P2	P3	P4	P5
	Internal				External

C. Learning- Action*-Performance* (LAP) synthesis*

The LAP synthesis presents the selection of key Learning* issues based on SAP analysis carried out in the previous step. Based on these learning* issues, further Action* are suggested along with desired Possible outcomes of the organization.

Learning* (L*) issues.

Based on SAP analysis of exhaustive literature following learning* issues are identified.

Learning*1 (L1*): Global vision of the organization. This global vision becomes the guideline for all the actions/decisions to be taken in the organization.

Learning*2 (L2*): Technology up-gradation. The decision of Technology up-gradation makes an impact on the desired outcomes, so it is important to study affect this in performance issues.

Learning*3 (L3*): MUDA reduction program. The MUDA was the biggest problem in the organization, so the MUDA reduction program became important to achieve its business goals.

Learning*4 (L4*): Capacity enhancement/Efficiency improvement.To address the issue of flexibility, wide range of products, it became necessary to enhance the capacity or to improve efficiency. A drive was initiated in the organization regarding this.

Learning*5 (L5*): Liaison with alternate energy resources. This was necessary to save money spent on power consumption, along with reducing the carbon footprints by the organization.The learnings derived from the SAP analysis helped the authors in the identification of actions to be carried for business excellence, for example, high energy consumption due to poor energy management prompts for assimilation of energy policy in core business policy. Similarly learning* are mapped with the actions* and presented in the appendix (Exhibit 4)

Actions* (A*)

Follow actions* are identified in the organization that can help in achieving business excellence

Action*1 (A1*): Energy policy as a core objective. It was decided to encapsulate the energy conservation policy in the core business policy of the organization. This decision was going to manipulate the business targets of the organization positively, along with environment nurture.

Action*2 (A2*): Maintenance policy. The maintenance policy of the organization was established to keep the overall equipment effectiveness (OEE) of the machines and overall plant effectiveness (OPE). This ensures the readiness of the plant.

Action*3 (A3*): Technology Management. The flexibility of the plant to produce a wide range of products is strengthened with the incorporation of technology management in the core business policy.

Action*4 (A4*): Use of IT in cost management. The use of information technology in cost management is utilized to monitor the cost data by closely monitoring the cost drivers such as power, tools, and consumables, etc.

Performance * (P*)

Performance* parameters in LAP synthesis are desired outcomes of the organization. The following are the performance* parameters.

Performance*1 (P1*): Productivity improvement. Higher productivity is the desire of every manufacturing

organization to cater to the need of the customers, to increase profit.

Performance*2 (P2*): Quality improvement. The organization is determined to deliver high-quality products to the customers at a low price.

Performance*3 (P3*): Power consumption reduction. The power consumption of the plant is a governing factor in calculating the profit share.

Performance *4 (P4*): Total conversion cost reduction. The low total conversion cost was also the desire of the organization to counter the high consumer price index and high inflation.

The suggested actions for business excellence improvement is going to affect the performance indicators of the organization in a positive manner. This information is presented in the cross-interaction matrix between Action* and Performance* in the appendix (Exhibit 5). The achievement of a performance indicator is going to further enhance the learning by acting as a feedback channel. This feedback knowledge base is presented in the cross-interaction form between Performance* and Learning*, as shown in the appendix (Exhibit 10).

D. Findings from analysis

In the SAP analysis, Table 3 shows the self-interaction of various situations elements; there is an interaction of situation S1 with situations S2 and S5 only. Situations S2 does not have any interaction in any situation. Situation S3 interacts with only situation S4. Table 2 is the binary representation of Table 3. Similarly, we can see the interaction for the selected actors in Table 5. Actor A1 interacts with actor A2 only, whereas actor A3 interacts with the only A2. Table 4 is the Binary representation of Table 5. Table 7 shows the self-interaction for the selected process. From the table, it can be seen that process P1 interacts with processes P3 and P5 only. Process P2 interacts with P3 and P4, P3 interacts with P4 only. There is no interaction between process P4 and P5. Table 6 is the Binary representation of Table 7.

Basic cross interaction matrices of SAP elements are shown from Table 9 to Table 12. Table 10 shows the cross interaction between the situation and the actors. This shows the roles of actors in various situations. Actor A1 plays a role in situation S1 and S2, whereas Actor A3 interacts with situation S4 and S5. Actor A2 interacts with all the situations. Table 9 is the binary representation of Table 10. Similarly, Table 12 shows the role of actors for carrying the various process in the cross-interaction matrix. From the table, Actor A1 has a role in only process P1 whereas Processes A2 and A3 interacts with all the process. Table 11 is the binary representation of Table 12. Findings from the LAP synthesis are listed below.

Suggested Learning issues*

The following action plan is developed based on the SAP analysis.

•The organization should include energy conservation and liaison policy in its core business excellence policy to save the environment and cost.

•The organization should include maintenance policy in its core business policy to improve OEE and OPE to improve manufacturing reliability continuously.

•There should be technology management in the organization with the core objective of digitization of manufacturing work to reduce the anticipated increase in conversion cost due to investment in process and technology and to improve fit and finish as per the international level.

•The organization should use information technology for cost management, improving service level for bulk and smaller batches.

Suggested Actions*

The following action plan is developed based on the SAP analysis.

•The organization should include energy conservation and liaison policy in its core business excellence policy to save the environment and cost.

•The organization should include maintenance policy in its core business policy to improve OEE and OPE to improve manufacturing reliability continuously.

•There should be technology management in the organization with the core objective of digitization of manufacturing work to reduce the anticipated increase in conversion cost due to investment in process and technology and to improve fit and finish as per the international level.

•The organization should use information technology for cost management, improving service level for bulk and smaller batches.

Suggested Performance* measures

The following parameters are suggested to measure the performance of the organization

•Productivity in terms of capability to produce a new model and early stabilization of the new model.

•Quality levels are to be measured in terms of zero month in service and 3 months in service.

•Power consumed due to system improvement, technology improvement, and MUDA.

•Total conversion cost in terms of the cost of the item per unit cost of energy consumed.

Based on the above, LAP synthesis following the theoretical framework is proposed, as shown in Fig. 1.

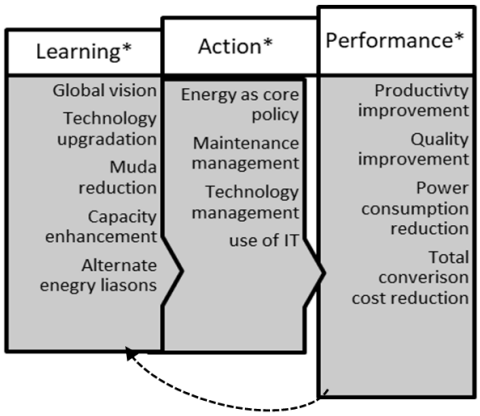

Fig. 1. Theoretical LAP framework.

IV. CONCLUSION

Every organization has a business excellence model. It is very important to understand its assets before the adoption of the business excellence model. SAP-LAP framework analysis is an approach that can help the integration of business excellence with the organization's policy. From the above analysis, it can be seen that in a situation of high inflation, an organization can become cost-effective by going for an alternate

source of power, reducing the cost of tooling, and using IT in cost management for better cost control. It was also observed that the quality rejection rate in the organization was high due to the poor quality of parts supplied by vendors. So, this paper suggests helping the implementation of quality management at the supplier ends. This SAP-LAP analysis grants freedom of choice to the organization to think in various dimensions. A theoretical LAP framework is also proposed for the organization. Due to the generic nature of the model, it may be useful for the organization.

V. FUTURE SCOPE

The SAP-LAP analysis of the above case study becomes the basis for the interpretive ranking of the various elements of the framework. The ranking of the elements helps in resolving conflicts and decision making.

Conflict of Interest. The authors declare that there is no conflict of interest.

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