Accomplishment of Critical Success Factor in Organization; Using Analytic Hierarchy Process

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Abstract

The importance role of performance evaluation in the organization has been proven. Complexity of decision making process will make strategic management as imperative affair. On the other hand, strategy is a plan of action designed to achieve a specific goal. Strategy is all about gaining (or being prepared to gain) a position of advantage over adversaries or best exploiting emerging possibilities. As there is always an element of uncertainty about future, strategy is more about a set of options ("strategic choices") than a fixed plan. Critical success factor (CSF) is the term for an element that is necessary for an organization or project to achieve its mission. It is a critical factor or activity required for ensuring the success of a company or an organization. The goal of this study is to propose an appropriate methodology for designing and implementing strategy and critical success factors in the organization. In order to achieve these goals, analytical hierarchical process (AHP) technique has been used and discussed in an automobile company.

Key Words

Analytical Hierarchical Process Technique (AHP), Critical Success Factor (CSF), Operation Evaluation, Strategy.

I. INTRODUCTION

The Complexity and fineness in creating business decisions, makes strategic management imperative. The manager tries to design strategic management in order to facilitate the condition compared to competitors in rivalry situation. However, a lot of them complain about Lack of effective implementation of their strategies. The viewpoint of these managers is obvious but their knowledge and perceptive of their employees is irrelevant and their compassion and contributions to achieve these purposes are negligible.

Senior managers continually seek to find ways to ensure their implementation strategies and then have selected performance evaluation method as a tool to implement their strategies. Although performance evaluation is vital factor to progress and development, creating an accurate and compatible model to organization condition is significant factor to evaluate the performance.

Besides that, the managers need to have information from all dimensions of organization to make a decision in complex and changing environment. Performance had better be measured correctly and expansively. These measures should cover whole aspects of an organization performance. Therefore, to attain the performance evaluation we need to determine the strategy and critical success factors which are the basic aim of this document.

II. OPERATION EVALUATION

The fast expansion of international rivalry in the last decade because of changes in technology and the increasing diversity of products have led to require continuous operation more than past. The managers in organization have five basic functions which are designing, arranging, leading, recruitment and controlling which controlling need to measure and assess more than all [2].

Feedback about performance is an integral component of any organizational control system. Perhaps the predominant appeal of the performance appraisal is shown that performance appraisals can provide numerous organizational benefits [4].

The universal assessment of an organization action set off not only to consider behavior effectiveness, but they also need efficient control of the business to reach durable objectives and strategies. Performance assessment assists the management to consider the situation and condition of organization under the control. The regular feature of total performance assessment models is attempted to communicate performance factors with the enterprise strategy and long term perspectives.

III. METHODOLOGY

This research is conducted as a case study in Automobile Manufacturer so the organization senior managers and experts have been chosen to examine and take decisions. In this section strategy and critical success factor is obtained. Figure 1 is offered to conduct this experiment.
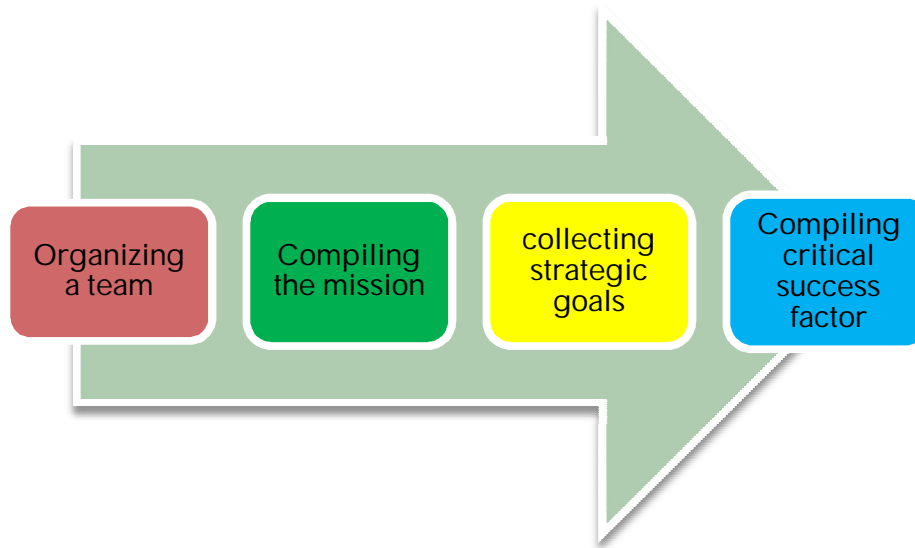
FIGURE1: CONCEPTUAL MODEL

A. Organizing a team

The project team is formed of 28 persons including 6 managers and 22 experts. A number of questionnaires have been administered among the personnel at first and then all of the ambiguities related to the question have been obviated. In this respect some question have been omitted and some other added [3].

B. Mission Statement

Mission is a description of the desired future conditions for organization. In other word mission is an image of organization to achieve their objectives and strategies [5]. Figure 2 shows the Company's mission.
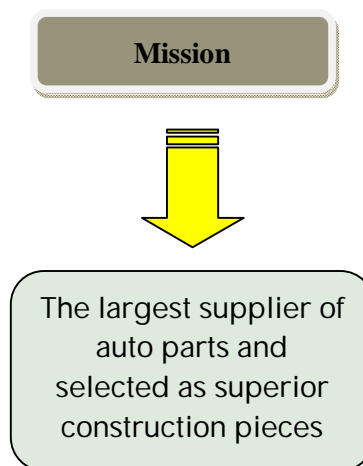

FIGURE 2: MISSION OF THE COMPANY

IV. STRATEGIC GOALS OF ORGANIZATION

A strategy is a plan of action designed to achieve a specific goal. Strategy is all about gaining (or being prepared to gain) a position of advantage over adversaries or best exploiting emerging possibilities. As there is always an element of uncertainty about future, strategy is more about a set of options ("strategic choices") than a fixed plan. Strategies examining process and selecting the most important alternative is based on the thinking and decisions of strategist [1].

So managers and experts of the strategic management team have compiled the major strategies in the Company. Strategic goals are as follows:

1- Promoting the customer orientation culture.
2- increase the ratio of assets
3- Continuous Improvement in organization
4- Efficiency unit of the provinces
5- Training skilled and committed workforce

V. DETERMINING OF CRITICAL SUCCESS FACTOR OF ORGANIZATION

A critical success factor is defined as limited number of factors affecting on ability and success of organization. Main success factors have been discussed by the managers and experts and finally regarding to vision, mission and strategic objective by majority vote in the committee session were announced and approved [8]. The critical success factors are as follows:

1. Development and maintenance of human resource
2. Promoting customer oriented culture
3. Performing tasks related to repairing and maintaining machinery
4. Promoting the suitability and competence of the personnel
5. Implementing intentional standards
6. Increasing the market share
7. Increasing personnel's cooperation
8. Gaining benefits in price and production
9. Taking prevention actions
10. Comprehensive management of expenses and increasing productivity
11. Growing technical knowledge and technology levels

Based on manager an expert opinion among critical success factors, four factors which have the highest effective into achieving organizations strategies should be selected. However, selecting the superior choice among existing alternative is a complicate process. In this regard hierarchical analyzing model is a powerful tool for solving complex problems.

VI. PRINCIPLES OF ANALYTICAL HIERARCHY PROCESS GROUP

Analytical Hierarchy Process is one of the most comprehensive system is designed to make decisions with multiple criteria because this technique provides to formulate the problem as a hierarchical and also consider various quantitative and qualitative criteria's. This process involved various options in the decision and able to use sensitivity analysis on the following criteria. In addition, AHP with applying paired comparisons make simplify judgments and calculations and it shows the compatibility and incompatibility the decisions which are the advantages of multi criteria decision making. [7]

At this stage the issue and goal of decision making is brought as a hierarchy of decision elements which are connected together. Decision making elements are decision indicators and decision options [10]. Since the hierarchical analyzing process is one of the tools assisting decision making the group established a hierarchy (Figure 3) which reflects the problem.
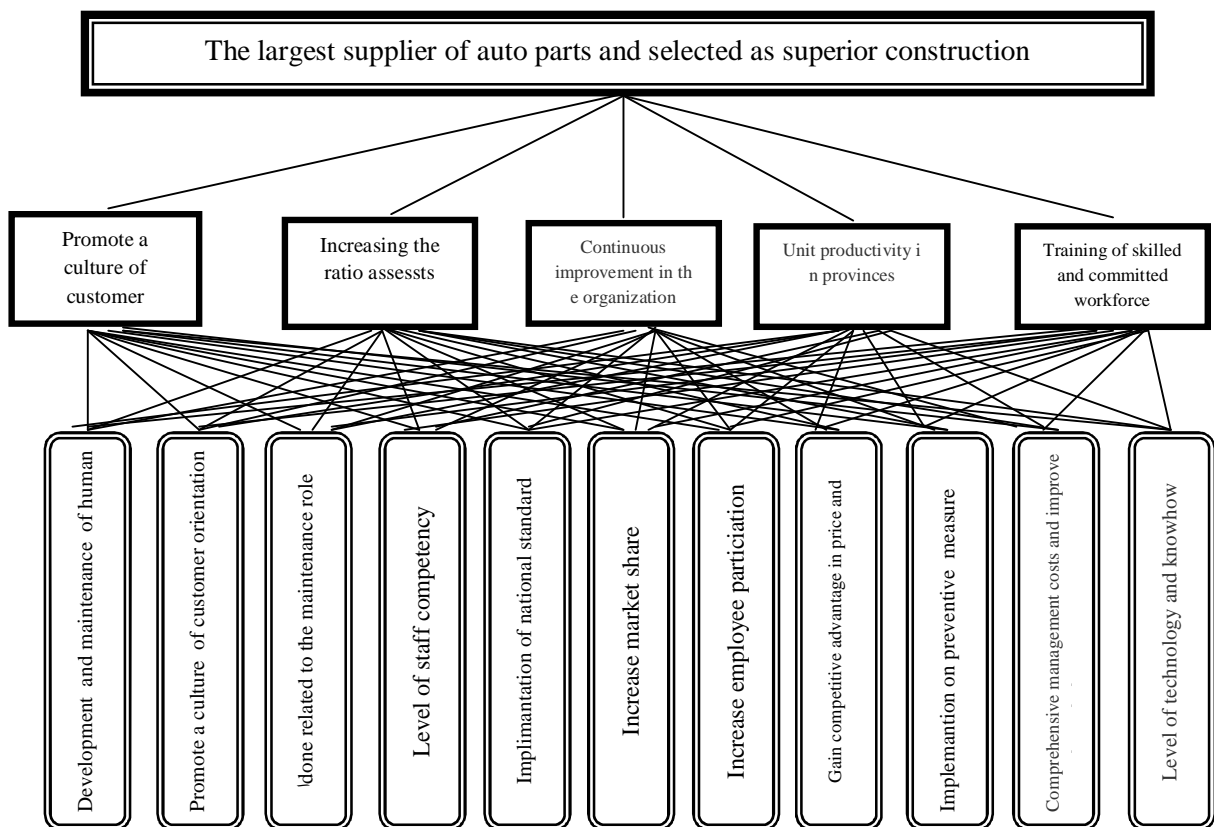

FIGURE 3: HIERARCHICAL TREE OF CRITICAL SUCCESS FACTORS

To conduct per comparison, first of all a questionnaire has been designed and managers and expert's opinion have been collected (see Table 1). It's noteworthy that each decision maker entered their desired amount for each member and then individual judgments (of each managers and expert) have been converted into group judgments (for each one of the pair comparison) using

their geometrical mean.

TABLE 1: CRITICAL SUCCESS FACTORS PAIR COMPARISON MATRIX

	CSF1	CSF2	CSF 3	CSF 4	CSF 5	CSF 6	CSF 7	CSF 8	CSF 9	CSF 10	CSF 11
CSF 1	1	2	1	3	0.33	0.33	0.5	4	3	5	0.5
CSF 2	0.5	1	2	0.5	1	1	3	0.5	3	0.25	0.33
CSF 3	1	0.5	1	1	0.33	0.25	0.33	0.2	5	0.25	3
CSF 4	0.33	2	1	1	0.5	1	3	0.5	3	0.33	0.25
CSF 5	3	1	3	2	1	0.33	0.5	3	4	1	1
CSF 6	3	1	4	1	3	1	1	2	4	1	0.25
CSF 7	2	0.33	3	0.33	2	1	1	1	3	1	0.25
CSF 8	0.25	2	5	2	0.33	0.5	1	1	0.12	0.25	0.11
CSF 9	0.33	0.33	0.2	0.33	0.25	0.25	0.33	8	1	1	0.2
CSF 10	0.2	4	4	3	1	1	1	4	1	1	1
CSF 11	2	3	0.33	4	1	4	4	9	5	1	1

As Table 1 shows critical success factors pair comparison matrix among the relative weight the Eigenvector method has been selected since the equation:

$$a_{ik} . a_{kj} = a_{ij}$$

Is not confirmed for all k,j,l,s,..

$$a_{12} = 2 , a_{23} = 2 \implies a_{13} \neq a_{12} \times a_{23} = 2*2 = 4$$

So the matrix is incompatible and in case of incomplete consistency pair comparisons matrix can't be used normalizing column to get Wi.

For a positive and reversed matrix like this pair comparison matrix, Eigenvector technique can be used which in it:

$$e^T = (1,1,\ldots,1)$$

$$W = \lim_{k \to \infty} \frac{A^k . e}{e^T . A^k . e}$$

To reach a convergence among the set of answers in to successive repetition of this process, calculation should be repeated several times in order to take a decision when facing an incompatible matrix. In this section matrix multiplication has been done to nine stages and as a result A9 has been calculated as the following

W9= [0.1054, 0.0666, 0.0765, 0.0633, 0.1026, 0.1118, 0.0805, 0.0611, 0.0550, 0.1062, 0.1709].

In Table 2, critical success factors are shown in regard to the calculated weight and in Table 3, four factors which have the most priority have been chosen.

TABLE2: PRIORITIZE THE CRITICAL SUCCESS FACTOR

Row	CSF	Priority	Weight
1	Development and maintenance of human resource	4	0.105371894
2	Promoting customer oriented culture	8	0.066642397
3	Performing tasks related to repairing and maintaining machinery	7	0.076570716
4	Promoting the suitability of the personnel	9	0.063264676
5	Implementing international standards	5	0.102595643
6	Increasing the market share	2	0.111849445
7	Increasing personnel's cooperation	6	0.080573971
8	Gaining benefits in price and production	10	0.061093479
9	Taking prevention action	11	0.055003055
10	Comprehensive management of expenses and increase productivity	3	0.10618637
11	Growing technical knowledge and technology level	1	0.170868354

Almost all the related calculations to hierarchical analyzing process have been done based on the decision maker's primary judgment. Any kind of incompatibility and error in comparison and importance determination between choices and indicators will after the final results of the calculations [12].

It the incompatibility rate is less than 0.1. The comparisons compatibility would be admitted and otherwise comparisons should be reviewed. [6], [7]. Considering the above said algorithm related to compatibility the hierarchical analysing indicator, pair comparison compatibility rate is calculated as below;

Compatibility rector element average or λmax:

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

λmax= 11.04934601

In which "n" is consisted of the number of existing choice in the issue:

C.I = 0.004934601

And compatibility ratio is calculated of dividing compatibility indicator to random indicator;

$$CR = \frac{CI}{RI}$$

So,   CR= 0.003267948

As a result, since C.R ≤ 0.1, this matrix is of high compatibility.

After determining success critical factors, they need to be categorized in order of priority. So, to weight the 4 superior organization critical success factors, Eigenvector method has been used. Table 3 shows the priority and weight of each one of those four factors.

As discussed above, the compatibility rate is as follows:

λ = 4.037512   C.I = 0.012504   C.R =0.013893

Since C.R ≤ 0.1, this matrix has high compatibility.

TABLE 3: PRIORITY AND WEIGHT OF FOUR SUPERIOR CRITICAL SUCCESS FACTORS

Critical success factor	Weight	Priority
Growing technical knowledge and technology level	0,1709	1
Increasing the market share	0.1118	2
Comprehensive management of expense & increase productivity	0.1061	3
Development & maintenance of human resource	0.1053	4

VII. CONCLUSION

The Complexity and fineness in creating business decisions, makes strategic management imperative. The manager tries to design strategic management in order to facilitate the condition compared to competitors in rivalry situation. As described, Critical success factors (CSF) play critical roles for an organization or project to achieve its mission. They are vital factors or activities required for ensuring the success of a company or an organization.

This paper has proposed an appropriate methodology for designing and implementing strategy and critical success factors in the organization using analytical hierarchical process (AHP) technique. In this case study, at first, the organization strategic concept, mission, strategic goals and critical success factor of the organization have been introduced. Then via AHP technique and considering the mission and strategy, the critical success factors have been weighted and categorized.

REFERENCES

[1]   Bryson, M.J. (1998). A strategic planning process for public and non-profit organizations, *Long Range Planning*, 21(1), 73–81.

[2]   Gill, A., & Lashine, S. (2003). Business education: a strategic market-oriented focus, *International Journal of Educational Management*, 17(5), 188 – 194.

[3]   Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research", *the Qualitative Report*, 8(4), 597-607.

[4]   Linda S. Pettijohn, R. Stephen Parker, Charles E. Pettijohn, ohn L. Kent. (2001). Performance appraisals: usage, criteria and observations, *Journal of Management Development*, (20) 9, 754 – 771.

[5]   O'Dea, Weiner, Woolrich. (2009). Business & Management – Course Companion – Clark, *Golden*, 24-51.

[6]   Ramanathan, R. (2001). A note on the use of the analytic hierarchy process for environmental impact assessment. *Journal of Environmental Management,* 63(1), 27–35.

[7]   Saaty, T., L., Peniwati, K. and Shang, J. (2007). The analytic hierarchy process and human resource allocation: Half the story. *Mathematical and Computer Modelling*, 46(7), 1041 - 1053.

[8]   Salleh, C.N., Yahya, Y., Alaa, M., Altemimi, H., Mukhtar, M. (2010). *Information Technology (ITSim)*, International Symposium in Syst. Manage. & Sci. Dept., Univ. Kebangsaan Malaysia, Bangi, Malaysia, vol 1,pp.1-5 Conference Publications.

[9]   Jalaliyoon, N. and Taherdoost, H. (2012). Propose a Model to Design and Implement Key Operational Indicators Relate to Performance Evaluation in Industrial Group, *Archives Des Sciences*, 65(8), 28-35.

[10] Jalaliyoon, N., Abu Bakar. N., and Taherdoost, H. (2012). Propose a Methodology to Implement Balance Score Card for Operational Appraisal of Industrial Group, *International Journal of Marketing and Technology*, 2(10), 269-278.