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USE INVESTIGATIVE ORDER DEVELOPMENT FOR PLANCOLLECTION WITH SIX SIGMA MODEL

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Abstract:- Since its inception at Motorola in the 1980s, and the objective was to reduce the number of defects to as low as 3.4 parts per million opportunities. Six Sigma is being adopted by many different organizations. The effectiveness of Six Sigma is well supported by subjective evidence. However, academic research on Six Sigma is still not matured. In this context, choice means adapting the correct decisions, choosing the best alternatives and timely optimization of your choices as the organizational environment changes. The AHP has proven to be extremely valuables six sigma and other business process improvement prioritization decisions when they involve both tangible and intangible strategic considerations. This paper first reviewed the current literature on Six Sigma, and then performed a critical analysis of Six Sigma. It is also presented the concept analytic hierarchy process (AHP) with using six sigma models for the project selection.

KeyWords: Six Sigma, Analytic Hierarchy Process (AHP), Project Selection

1. INTRODUCTION

A Successful organization recognizes that when an effective strategy is properly implemented, (Bertels & Patterson, 2003), In this context, choosing means making the correct decisions, selecting the best available alternative and timely optimization of your choices as the organizational environment changes. The AHP method being proven extremely valuables and other business process upgrading prioritization decisions when they involve both touchable and imperceptible strategicconsiderations. (Chen, Hsu, & Tzeng, 2011).

MODELING STRATEGIC FRAMEWORK

The Balanced Scorecard is a good framework that enables organizations to analyze their success from four perspectives: (Gels, 2005)

1. Financial Perspective
2. Customer Perspective
3. Operational Perspective
4. HR Perspective

The Financial Perspective’s outcome is an external perspective used to view the financial results of an organization. The customer perspective is also external, articulating the customer value proposition/benefit a customer receives from an organization.

The Operational Perspective renders insight into the internal operations of the organization, which ultimately helps an organization achieve the financial and customer perspective outcomes. The HR perspective is a view of how to manage the human capital under an organization to enable the operations of the business.

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If you model the strategic framework using the balanced scorecard model, then you can get to make choices based on these four perspectives. Consider the top to down perspective of a successful strategy aligned within an organization and a successful six sigma deployment. Ideally, the organization will have: (Kaplan & Norton, 1992)

- A clear vision and mission statement.
- A well-formed strategy articulated using a balanced score card model.
- An aligned metrics and goals that cascade down from the apex of the strategy pyramid through the lines of business into the divisions and functional areas and to each individual.

In this context, occupational course enhancement projects selection will be aligned to the strategic goals of the organization. Clearly, there is a essential for a reliable way to make effective and consistent business decisions or choices. Thomas Saaty, developer of AHP, has spent many years examining decision making as a process, including the optimal selection of the project portfolio aligned to an organizational strategy. The principles of his research are completely applicable to business process improvement projects and the optimization of a project portfolio. (Triantaphyllou, 2002)

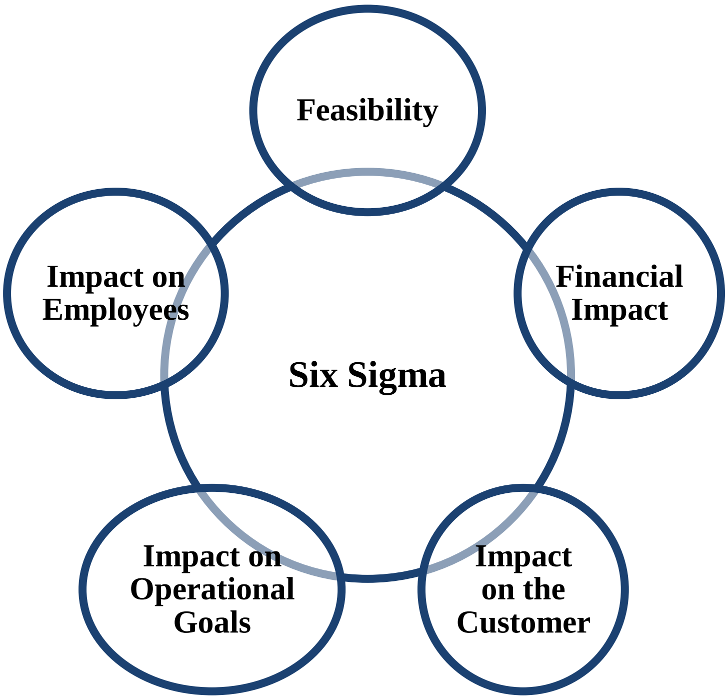

Fig.1.1. Decision Goal – To Optimize SixSigmaPortfolios

After the Hierarchy has been achieved, the Criteria must be evaluated in pairs to determine the relative importance between them and their Relative Weight to the Global Goal. The Evaluation begins by determining the Relative Weight of the initial criteria groups for New Project Selection **(Figure 1.1)**. **Table 1.3** shows the Relative Weight data between the determined criteria. (Kelly, 2002)

CM for Optimize Six Sigma Portfolios

Six Sigma Criteria	Feasibility	Financial Impact	Impact on the Customer	Impact on Operational Goals	Impact on Employees
Feasibility	1	2	3	5	9
Financial Impact	0.5	1	1	4	7
Impact on the Customer	0.33333	1	1	2	6
Impact on Operational Goals	0.2	0.25	0.5	1	9
Impact on Employees	0.11111	0.14286	0.16667	0.11111	1

Table 1.3: CM for Optimize Six Sigma Portfolios

Six Sigma Criteria	Feasibility	Financial Impact	Impact on the Customer	Impact on Operational Goals	Impact on Employees
Feasibility	0.46632	0.45528	0.52941	0.41284	0.28125
Financial Impact	0.23316	0.22764	0.17647	0.33028	0.21875
Impact on the Customer	0.15544	0.22764	0.17647	0.16514	0.1875
Impact on Operational Goals	0.09326	0.05691	0.08824	0.08257	0.28125
Impact on Employees	0.05181	0.03252	0.02941	0.00917	0.03125

Table 1.4: Optimize Six Sigma Portfolios after Normalized Matrix Value

Six Sigma Criteria	Feasibility	Financial Impact	Impact on the Customer	Impact on Operational Goals	Impact on Employees
Feasibility	0.4293				
Financial Impact		0.2373			
Impact on the Customer			0.1824		
Impact on Operational Goals				0.1204	
Impact on Employees					0.0304

Table 1.5: Optimize Six Sigma Portfolios for Eigen Vector Value

EV	0.42902	0.23726	0.18244	0.12045	0.03083
S	2.14444	4.39286	5.66667	12.1111	32
1 * 2	0.92001	1.04225	1.03382	1.45873	0.98669
EV max λ	***5.4415***				

Table 1.6: Optimize Six Sigma Portfolios for EV Val max λ

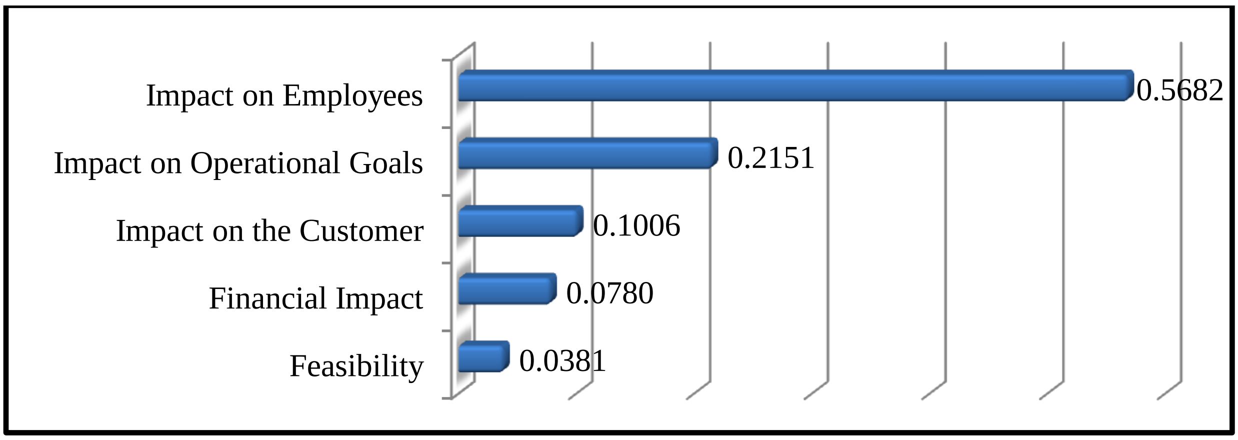

Figure 1.2: Ranking of the Judgement Criteria

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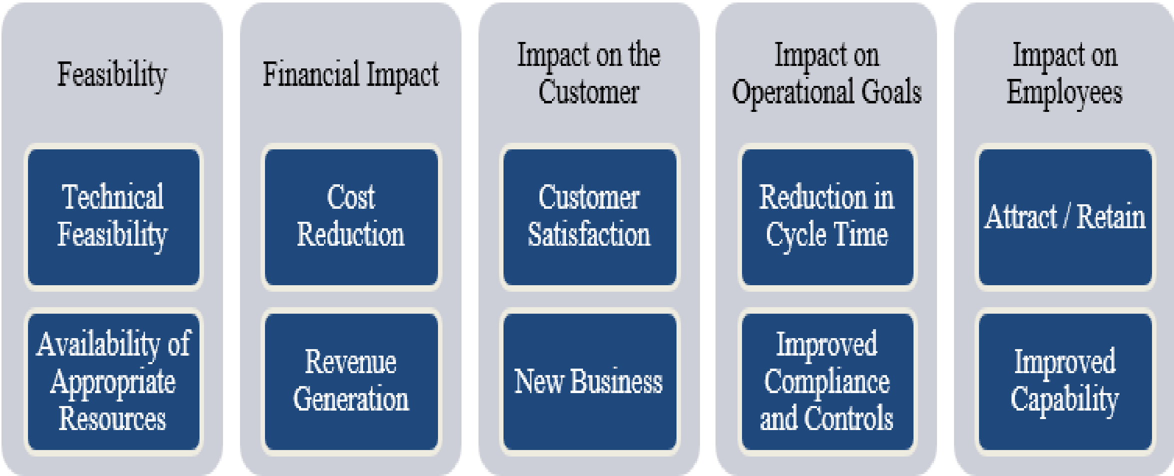

Figure 1.3: Weighted Value Hierarchy

Six Sigma Criteria	Technical Capabilities	Availability of Appropriate Resources	Cost Reduction	Revenue Generation	Customer Satisfaction	New Business	Reduction in Cycle Time	Improved Compliance and Controls	Attract / Retain	Improved Capability
Technical Feasibility	1	3	2	1	4	5	9	7	8	6
Availability of Appropriate Resources	0.3333	1	1	3	2	4	8	9	5	8
Cost Reduction	0.5	1	1	2	1	3	1	5	6	7
Revenue Generation	1	0.3333	0.5	1	3	2	2	4	7	6
Customer Satisfaction	0.25	0.5	1	0.3333	1	1	3	3	9	8
New Business	0.2	0.25	0.3333	0.5	1	1	4	2	3	5
Reduction in Cycle Time	0.1111	0.125	1	0.5	0.3333	0.25	1	1	2	4
Improved Compliance and Controls	0.1428	0.111111	0.2	0.25	0.3333	0.5	1	1	1	3
Attract / Retain	0.125	0.2	0.1667	0.1428	0.1111	0.3333	0.5	1	1	1
Improved Capability	0.1667	0.125	0.1428	0.1667	0.125	0.2	0.25	0.3333	1	1

Table 1.7: Sensitivity Analysis for Comparison Matrix to Optimize Six Sigma Portfolios

The following ***Table 1.7*** shows the Sensitive Analysis for Comparison Matrix to Optimize Six Sigma Portfolios with their Pair-Wise Comparisons. (Bhushan & Rai, 2004)

Six Sigma Criteria	Technical Capabilities	Availability of Appropriate Resources	Cost Reduction	Revenue Generation	Customer Satisfaction	New Business	Reduction in Cycle Time	Improved Compliance and Controls	Attract / Retain	Improved Capability
Technical Feasibility	0.2611	0.4515	0.2723	0.1124	0.3100	0.2892	0.3025	0.2100	0.1860	0.1224
Appropriate Resources Availability	0.0870	0.1505	0.1361	0.3373	0.1550	0.2314	0.2689	0.2700	0.1162	0.1632
Cost Reduction	0.1305	0.1505	0.1361	0.2249	0.0775	0.1735	0.0336	0.1500	0.1395	0.1428
Revenue Generation	0.2611	0.0501	0.0680	0.1124	0.2325	0.1157	0.0672	0.1200	0.1627	0.1224
Customer Satisfaction	0.0652	0.0752	0.1361	0.0374	0.0775	0.0578	0.1008	0.0900	0.2093	0.1632
New Business	0.0522	0.0376	0.0453	0.0562	0.0775	0.0578	0.1344	0.0600	0.0697	0.1020
Reduction in Cycle Time	0.0290	0.0188	0.1361	0.0562	0.0258	0.0144	0.0336	0.0300	0.0465	0.0816
Improved Compliance and Controls	0.0373	0.0167	0.0272	0.0281	0.0258	0.0289	0.0336	0.0300	0.0232	0.0612
Attract / Retain	0.0326	0.0301	0.0226	0.0160	0.0086	0.0192	0.0168	0.0300	0.0232	0.0204
Improved Capability	0.0435	0.0188	0.0194	0.0187	0.0096	0.0115	0.0084	0.0100	0.0232	0.0204

Table 1.8: Sensitivity Analysis for Comparison Matrix to Optimize Six Sigma Portfolios after Normalized Matrix Value

Six Sigma Criteria	Technical Feasibility	Availability of Appropriate Resources	Cost Reduction	Revenue Generation	Customer Satisfaction	New Business	Reduction in Cycle Time	Improved Compliance and Controls	Attract / Retain	Improved Capability
Technical Feasibility	0.2518									
Availability of Appropriate Resources		0.1916								
Cost Reduction			0.1359							
Revenue Generation				0.1313						
Customer Satisfaction					0.1013					
New Business						0.0693				
Reduction in Cycle Time							0.0472			
Improved Compliance and Controls								0.3120		
Attract / Retain									0.0220	
Improved Capability										0.0184

Table 1.9: Sensitivity Analysis for Comparison Matrix to Optimize Six Sigma Portfolios for Eigen Vector Value

EV	0.251782	0.191599	0.135926	0.131257	0.101298	0.06931	0.04723	0.031224	0.021988	0.018386
Sum	3.828968	6.644444	7.342857	8.892857	12.90278	17.28333	29.75	33.33333	43	49
1 * 2	0.964065	1.273067	0.998083	1.16725	1.307029	1.197913	1.405092	1.040798	0.94547	0.900936
EV max λ	***11.2000***									

Table 1.10: Sensitivity Analysis for Comparison Matrix to Optimize Six Sigma Portfolios

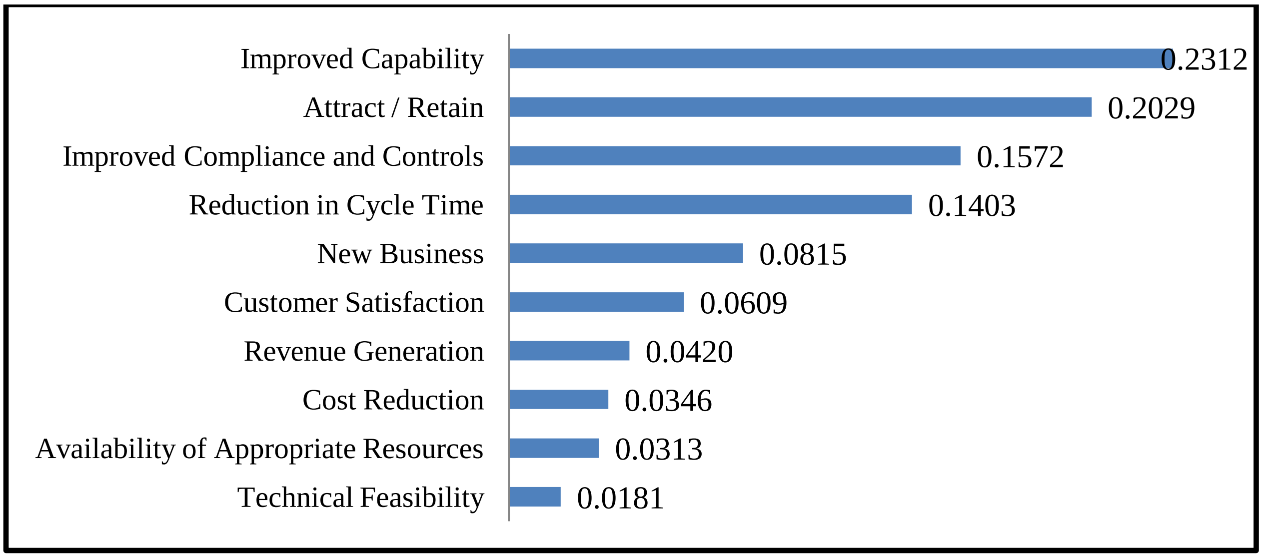

Figure 1.4: Rank and Relative Importance of the Judgement Criteria for Sensitivity Analysis to Optimize Six Sigma Portfolios

2. PRIORITY VECTOR VALUE BASED SUMMARY

For this research layer 1 and layer 2 are structured for key performance indicators.

Table 1.11: Priority Vector Value Summary

Layer		**Comparison Matrix Eigen Value max λ**	**CI**	**CR**	**Accepted / Rejected**	**Remarks**
1	Six Sigma Portfolios	05.4415	0.4415	9.85%	Accepted	—
2	Sensitivity Analysis of Sub Criteria	11.2000	1.1997	8.95%	Accepted	

Note: RI for n = 5 is 1.12 & n = 10 is 1.49, CI and CR is Consistency Index and Consistency Ratio. **CR < 10%, hence subjective evaluation about its importance is consistent and acceptable.**

Table 1.12: Analytical Hierarchy for each Six Sigma Portfolios

Six Sigma	Weighting	Criteria	Weights	Ranks
Feasibility	0.0381	Technical Feasibility	0.0181	***10***
		Availability of Appropriate Resources	0.0313	***9***
Financial Impact	0.0780	Cost Reduction	0.0346	***8***
		Generation of Revenue	0.0420	***7***
Customer Impact	0.1006	Customer Satisfaction	0.0609	***6***
		New Business	0.0815	***5***
Operational Goals Impact	0.2151	Reduction in Cycle Time	0.1403	***4***
		Improved Compliance and Controls	0.1572	***3***
Employees Impact	0.5682	Attract / Retain	0.2029	***2***
		Improved Capability	0.2312	***1***

3. FINDINGS

The results and discussions of adopted methodology (AHP approach) have been presented and discussed as follows:

1. It is found that Impact on Employees (1), Impact on Operational Goals (2), Impact on the Customer (3), Financial Impact (4) and Feasibility (5) are categorized ranked after developing AHP method.
2. It is affirming that the result of all business indicators, researcher has found that in Impact on Employees, to optimize Six Sigma indicators are ranked Based on Analysis of the weights measures with AHP Method in below manner: Improved Capability (1) and Attract / Retain (2).
3. In the assessment of use of the performance measures of Impact on Employees (Improved Capability), the percentage was located at a relative weight of 20.29% and Attract / Retain was at 23.12%.
4. After getting the result of all business indicators, researcher has found that in Impact on Operational Goals, to optimize Six Sigma indicators are ranked Based on Analysis of the weights measures with AHP Method in below manner: Improved Compliance and Controls (3) and Reduction in Cycle Time (4).
5. In the assessment of use of the performance measures of Impact on Operational Goals (Improved Compliance and Controls), the percentage was located at a relative weight of 15.72%, while Reduction in Cycle Time was at 14.03%.
6. After getting the result of all business indicators, researcher has found that in Impact on the Customer, to optimize Six Sigma indicators are ranked Based on Analysis of the weights measures with AHP Method in below manner: New Business (5) and Customer Satisfaction (6).
7. In the assessment of use of the performance measures of Financial Impact (Revenue Generation), the percentage was located at a relative weight of 4.20% and Cost Reduction was at 3.46%.

8. In the assessment of use of the performance measures of Feasibility (Availability of Appropriate Resources), the percentage was located at arelative weight of 3.13% and Technical Feasibility was at 1.81%.

4. CONCLUSIONS

Organizations are constantly looking for methods to improve the quality of their processes and goods while also differentiating themselves from their competitors in order to increase customer happiness and income. Six Sigma is one of the approaches used to monitor and enhance a company's operational performance and systems by identifying and preventing errors in manufacturing and service-related operations in order to surpass consumer expectations. The right selection of project among numerous alternatives is a major element for the success of the six-sigma program. Nowadays, the AHP approach is employed in a variety of decision-making settings. We have decided to propose its application for project evaluation and selection. AHP has the potential to significantly improve the process of creating project proposals. According to the findings of this investigation, when a If a business implements simply lean manufacturing or both lean manufacturing and six sigma, it might expect parallel results in innovation performance. This report also demonstrates that organizations that use limited lean and six sigma tools do pretty poorly.

Finally, it is critical to underline that decision making necessitates a broader and more comprehensive grasp of the environment than the application of any one technique. It assumes that a portfolio decision is the result of discussion, human factors, and strategic analysis, where methodologies like AHP favor and guide task execution, but they cannot and must not be utilized as a uniform criterion.

5. REFERENCES

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