Evaluation of Innovative Product Development Practices in an Organization: A Case Study*

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***Abstract*— Developing new products is a complex and risky decision making process which involves a search of the environment for opportunities, the generation of project options, and the evaluation by different experts of multiple attributes, both qualitative and quantitative. To perceive and to measure effectively the capability of new product development (NPD) remains a real challenging task for business managers. The present study aims to improve the accuracy of decision-making in evaluating performance of innovative product development (IPD) practices under uncertainty. To provide fresh insight to fill some of the knowledge gaps in this area with particular focus on evaluating IPD performance from an organization perspective combined Analytical Hierarchy Process (AHP) and Performance Value Analysis (PVA) methodology is proposed. In this method, the AHP and PVA algorithms are combined where AHP is used to prioritize the elements and then using the prioritization value of elements along with key performance indices for each element, the performance of the system was evaluated by using PVA. To demonstrate the methodology to evaluate the organization's IPD practices performance against the benchmarking organizations, the case study is considered.**

Keywords— Performance evaluation; IPD practices; AHP-PVA method

I. Introduction

New product development (NPD) is indeed the cornerstone for companies to enhance and maintain the competitive edge (Wang, 2009). However, developing new products is a complex and risky decision making process which involves a search of the environment for opportunities, the generation of project options, and the evaluation by different experts of multiple attributes, both qualitative and quantitative. To perceive and to measure effectively the capability of NPD remains a real challenging task for business managers. Basically, the decision process is to weigh the diverse alternatives that each have to choose from the set of desired objectives and to figure out the best solution amongst the different challenging and conflicting goals set (Buyukozkan and Feyzıoglu, 2004). Most of the organizations cannot properly appreciate the NPD activities so as to deal with the innovation in the new economy and to fulfill the customer demands adequately. The managers in an organization spend most of their time to constantly evaluate the existing innovative product development (IPD) practices and strive to improve the performance of their IPD activities and process. One approach adopted is that of comparing current practice with that of another organization (Barclay and Dann, 2000). The importance of performance measurement is generally recognized in the literature and by industry but the adequacy of metrics applicable to compare different aspects of the organization does not appear to have been addressed (Driva, et.al., 2001).The aim of this study is to improve the accuracy of decision-making in evaluating performance of IPD practices under uncertainty. The present study provides fresh insight to fill some of the knowledge gaps in this area with particular focus on evaluating IPD performance from an organization perspective. To demonstrate the methodology to evaluate the organization's IPD practices performance against the benchmarking organizations, the case study is considered.

II. Overview of Case and Methodology

"ABC Motor Company" is the third largest two wheeler manufacturer in India and is engaged in the business of two wheelers, automobile component manufacturing and retailing of various brands in India. The company manufacturers an entire range of two-wheelers including motorcycles, scooters and mopeds, offering a complete portfolio from the entry level right up to the premium segment. The company also has product offerings for the three-wheeler industry. The Company has manufacturing plants that conform to world-class quality standards and has international presence in more than 50 countries in Asian, African and Latin American Continents and will enter more international markets. In India, the company functions through a strong sales and service network consisting over 490 authorized main dealerships, over 1800 authorized service centers. The company believes that their strength lies in design and development of new products. The company's NPD process focusses on delivering total customer satisfaction by anticipating customer need and presenting quality vehicles at the right time and at the right price. The R& D department of the case organization focuses on bringing the best of innovation and technology to mainstream. ABC Company's technology features are aimed at providing value to a customer by matching the features to the expectation or price point. Even after giving attention to customer focus, optimum performance, bikes that are easy to ride, economical to maintain and environment friendly, the company still is not able to move ahead from his third position in terms of sales. Hence, the top management of the organization worked towards in finding out which practices of the company were lagging compared with the top two competitors on their category. For the present case, it was assumed that ABC Company needs to evaluate its performance in terms of its innovative product development performance with respect to the two benchmarking organizations i.e. "PQR Company" and "XYZ Company". The authors attempted to analyze the above case situation and therefor in retrospect acted as "decision makers" to identify an optimal solution. It should be understood here that the purpose of this case study is to demonstrate a decision making process for a situation which is not yet addressed in the literature. The AHP and PVA algorithms are combined to prioritize the elements (i.e. CSFs) and then using the prioritization value of elements along with key performance indices (KPIs) for each element, the performance of the system was evaluated.

Development of AHP to prioritize KPIs

To address the above case problem, it was proposed to develop Multi Attribute Decision Model (MADM). In the literature, numerous MADM models are available like Analytic Hierarchy Process *(*AHP), Elimination and Choice Translating Reality (ELECTRE), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), Preference Ranking Organization Method of Enrichment Evaluations (PROMETHEE), Multi-Attribute Utility Theory (MAUT), Joint Probability Decision-making (JPDM), Equivalent Cost Analysis (ECA), etc. Although many models are available, AHP has been selected for modelling the above problem for the following reasons (Anand and Kodali, 2012):

- AHP has been utilised in diverse applications and AHP is capable and versatile to model any decision-making situations in different areas of applications.
- Vaidya and Kumar (2006) reviewed AHP literature and reported that the application of AHP is more widespread than any of other MADM models listed above. Probable reasons can be that, the practitioners and academicians may find it easy to understand and use it for real-life decisions. Also, AHP has the capability to be integrated with other methodologies such as QFD, meta-heuristics, strength-weakness-opportunity-threat (SWOT) analysis, data envelopment analysis, etc. Ho (2008) has reviewed the application of integrated AHP (i.e. use of AHP in combination with other methodologies) from the year 1996 to 2007. Thus, these reviews by Vaidya and Kumar (2006) and Ho (2008) concludes that AHP has wider applications than any of the MADM models.
- Another reason for wider application of AHP can be attributed to availability of commercially available software package called Expert Choice. Although other MADM models too have dedicated commercial software packages (for instance, Decision Lab 2000 for PROMETHEE), the algorithm of AHP permits the decision makers to develop their own programme or use the Microsoft Excel to model and carry out necessary computations.
- Finally, AHP would be appropriate whenever a goal is clearly stated and a set of relevant criteria and alternatives are available. It is one of the very few MADM models capable of handling so many attributes/criteria, even if some of them are qualitative. The problem under study, too, falls under this category and hence can be easily modelled using AHP.

AHP Methodology

Analytic Hierarchy Process (AHP) was developed by Saaty (1980) as a practical approach in solving relatively complex problems. It enables the decision maker to represent the simultaneous interaction of many factors in complex, unstructured situation. Wabalickis (1988) noted that the AHP has been well received by the researchers and it has been applied in the diverse traditional fields such as technology selection, logistics, manufacturing etc. Since the current problem involves more number of quantitative and qualitative factors, AHP was found more suitable for analysis (Anand and Kodali, 2012). Saaty (1980) has discussed about the steps to be followed in developing the AHP model, which has been demonstrated by Anand and Kodali (2012) is adapted to explain the methodology. The steps are given below:

Step 1: Define the problem and determine the objective and alternatives along with the identification of the important elements involved.

The problem identified in our case is the prioritization of innovative product development elements of the three companies discussed in the case problem. The alternatives available are, ABC company, PQR company and XYZ company. These alternatives will be evaluated and compared in the light of above determined set of elements and key performance indices. Table I shows the elements and key performance indices that were identified from the literature and validated through empirical study.

Table I: Elements and key performance indices of innovative product development process (Vinayak and Kodali, 2014)

S.No.	Element (CSF)/ Variables(KPIs)	In Short
	Product innovation	**PRD**
1	Newness /Novelty/ Originality / Uniqueness	PRD1
2	Cost/pricing/Value for money	PRD2
3	Upgrading features in existing products/Product enhancement	PRD3
4	Quality	PRD4
5	Differentiation/Variety	PRD5
6	Best use of new technology	PRD6
	Process innovation	**PRO**
7	New production methods	PRO1
8	Process flexibility	PRO2
9	Process efficiency	PRO3
10	Delivery/ Speed of distribution	PRO4
11	Production cost	PRO5
	Market innovation	**MRK**
12	Gathering market information / Identification of new market	MRK1
13	Advertising/Promotion/Marketing campaigns	MRK2
14	Analyzing competitors	MRK3
15	Generation of new types of customers/ Entry into new geographical markets	MRK4
16	Customer focus/ Customer relationship management	MRK5
	Service innovation	**SER**
17	Service cost reduction	SER1
18	After sales support services	SER2
19	Service infrastructure	SER3
20	Service administration	SER4
	Behavioral innovation	**BHV**
21	Employees individual innovativeness	BHV1
22	Employees team innovativeness	BHV2
23	Effective flow of communication	BHV3
24	Effective interpersonal communication	BHV4
25	Maintenance of culture to ensure novel solution	BHV5
	Managerial innovation	**MNG**
26	Administration/ Leadership innovation	MNG1
27	Focus on feasibility studies/ Risk taking attitude of management	MNG2
28	Management strategy on innovation	MNG3
29	Support for idea management / Knowledge management	MNG4
30	Organization’s characteristics	MNG5
31	Motivation of people to innovate	MNG6
	NPD strategy	**STR**
32	Cycle time reduction	STR1
33	Competitive advantage	STR2
34	Reduction in cost	STR3
35	Fast-follower strategy	STR4
	NPD support system	**NPS**
36	CAD/CAE/Virtual Prototyping	NPS1
37	Project management	NPS2
38	Rapid prototyping systems	NPS3

S.No.	Element (CSF)/ Variables(KPIs)	In Short
39	Technology commercialization and testing	NPS4
	Product portfolio& structure	**PPS**
40	Modular	PPS1
41	Joint ventures	PPS2
42	Outsourcing	PPS3
43	Improvements	PPS4
44	Cost reduction	PPS5
45	Additions to existing lines	PPS6
	NPD team	**TEM**
46	Cross-functional teams.	TEM1
47	Team composition.	TEM2
48	Simultaneous / Concurrent Engineering	TEM3
	NPD tools	**TOL**
49	Quality function deployment (QFD)	TOL1
50	Six sigma / Quality management	TOL2
51	DFMA / DF'X'	TOL3
52	Failure mode and effects analysis (FMEA)	TOL4
	Product launch	**PRL**
53	Product launch cycle time	PRL1
54	Promotion expenditure	PRL2
55	Launch strategy for new products	PRL3
56	Post launch feedback mechanism	PRL4
57	Pricing policy	PRL5
	Concept generation and testing	**CGT**
58	Innovative planned activities to fill gaps	CGT1
59	New product department	CGT2
60	Voice of the customer	CGT3

Step 2: Structure the identified elements in a hierarchy from the top through the intermediate levels to the lowest level. Figure I shows the schematic of AHP model for evaluation of various alternative organizations. In Figure I, the objective or problem definition was put in the first level, factors (i.e. main-elements or dimensions) are in the second level, sub- elements are in third level, while the alternatives represent the last level.

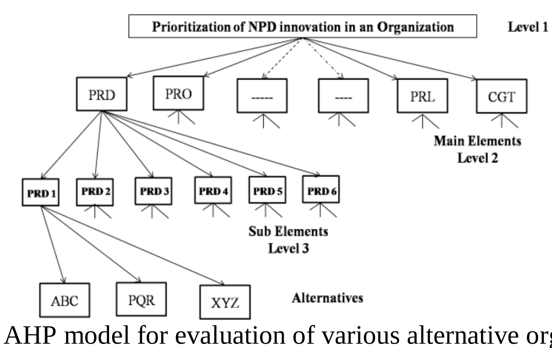


Figure I: AHP model for evaluation of various alternative organizations

Step 3: Construct a set of pair-wise comparison matrices for each of the lower levels. An element in the higher level is said to be a governing element for those in the lower level, since it contributes to it or affects it. The elements in the lower level are then compared to each other based on their effect on the governing element above. This yields a square matrix of judgments. The pair-wise comparisons are done in terms of which element dominates another. These judgments are then expressed as integers. If element A dominates over element B, then the whole number integer is entered in row A, column B and reciprocal is entered in row B, column A. If the elements being compared are equal, then '1' is assigned to both positions. Thus, there are n (n-1)/2 judgments required to develop a single pair-wise comparison matrix (as reciprocals are automatically assigned in each pair-wise comparisons). For entering the integer values, the scale of relative importance prescribed by Saaty (1980) should be used. Table II shows the pair-wise comparison matrix for level 2. In this case, a pair-wise comparison matrix is constructed for the elements. For instance, pair-wise comparison is carried out between the main elements 'Behaviroal Innovation (BHV)' and 'Process Innovation (PRO)', BHV is considered to be more important than PRO. Hence 5 is entered in the row 2, column 4, while 1/5 is entered in row 4, column 2 in Table II.

Table II: Pair-wise comparison matrix – level 2 (Sample)

	PRD	PRO	MRK	SER	BHV	MNG	STR	NPS	PPS	TEM	TOL	PRL	CGT
PRD	1	0.5	5	8	4	1	5	4	2	3	8	7	6
PRO	2	1	6	9	5	2	6	5	3	4	9	8	7

Having done all the pair-wise comparisons and entered the data, the consistency is determined using the eigen value. To do so, normalize the column of numbers by dividing each entry by the sum of all entries. Then summate each row of the normalized values and take the average. This provides Principal Vector (PV) or Eigen value. Table III shows the normalized Weight-age comparison matrix – level 2.

Table III: Normalized weight-age comparison matrix – level 2 (Sample)

	PRD	PRO	MRK	SER	BHV	MNG	STR	NPS	PPS	TEM	TOL	PRL	CGT	SUM	PV
PRD	0.159	0.131	0.204	0.19	0.18	0.151	0.19	0.17	0.173	0.183	0.178	0.171	0.194	2.27	0.175
PRO	0.318	0.263	0.245	0.21	0.22	0.301	0.23	0.213	0.259	0.244	0.2	0.195	0.226	3.13	0.24

Consistency index = CI=0.047611 Consistency Ratio = CR=0.030520

Step 4: The next step is to check the consistency of the judgements of the decision makers. The following steps are utilized to check the consistency of judgements:

- Let the pair-wise comparison matrix be denoted M_1 and principal vector be denoted M_2.
- Then define $M_3 = M_1 * M_2$; and $M_4 = M_3 / M_2$.
- λ_{max} = average of the elements of M_4.
- Consistency Index (CI) = $(\lambda_{max} - N) / N - 1$
- Consistency Ratio (CR) = CI / RCI corresponding to N; where

RCI: Random Consistency Index , N: Number of elements.

Random index table (Wabalickis, 1988)

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59

If CR is less than 10%, judgments are considered consistent. And if CR is greater than 10%, the quality of judgments should be improved to have CR less than or equal to 10%. The CR is found to be less than 10 percent for the pair-wise comparison of main-attributes (dimensions), which is shown in Table II. Hence the judgments are consistent.

Step 5: Steps 3-5 are performed to have relative importance of each attribute for all levels and clusters in the hierarchy. Table IV illustrates the key performance indices analysis under the attribute 'Managerial Innovation (MNG)'. As mentioned above, the PVs and the consistency of the judgments are computed and it was found that the judgments were consistent for all the key performance indices analysis. Similar to Table IV, twelve more tables were obtained for each main-attribute.

Table IV: Normalized key performance indices for 'Managerial innovation (MNG)'– level 3 (Sample)

	MNG1	MNG2	MNG3	MNG4	MNG5	MNG6	SUM	PV
MNG1	0.26	0.25	0.26	0.29	0.30	0.25	1.61	0.27
MNG2	0.05	0.05	0.05	0.05	0.04	0.05	0.29	0.05

C.I.=0.00789033 C.R.= 0.00636

Step 6: The relative weight of each key performance indicator (RWPI) is calculated by multiplying its relative importance (NWKPI) with the respective relative importance value of its element at higher level (NEW). Table V shows the relative weightage of key performance indicators or variables.

Table V: Relative weightage of key performance indicators (sample)

NKPI	NWKPI	NWE	RWPI		NKPI	NWKPI	NWCSF	RWPI
MRK1	0.09	0.041	0.004		PPS3	0.28	0.089	0.025

NKPI: Notation of KPI; NWKPI: Normalized weight-age for KPI; NWCSF: Normalized weight-age for CSF; RWKPI: Relative weightage KPI

Development of PVA to measure the performance of IPD practices

Since there are many main elements (significant category) and key performance indices (performance measures) to be analysed during decision-making, the use of Performance Value Analysis (PVA) was suggested. The PVA model is well received in literature (Anand and Kodali, 2008). It is a revised version of utility value analysis, which considers the direct/indirect and quantitative/qualitative elements/criteria/attributes/performance indicators and aggregates the weight values of such multiple criteria to arrive at a decision. To demonstrate the PVA, the input from the decision making team of the case organisation were utilised, who were asked to compare the alternatives in light of the above-listed performance measures. The data obtained from them were fed into the PVA.

PVA methodology

The algorithm given by Anand and Kodali (2008) was adapted to develop the PVA model. The steps to follow in using the PVA are as follows:

Step 1. Define the problem and determine the objective. In this case, the problem is the prioritization of IPD Practices in organization, which can help the case organisation to achieve a significant competitive advantage over other firms, while the objective is to justify the same based on its impact on the performance measures.

Step 2. Identify the alternatives 'a_i' available. The alternatives are: ABC Company,XYZ Company and PQR Company.

Step 3. Determine the attributes/criteria/performance indicators 'c_j' that govern the problem. They are obtained from the list parameters identified in Table I.

Step 4. Classify the attributes/criteria/parameters into significant categories. The parameters were already classified into the following significant categories of product innovation (PDI), process innovation (PRI), market innovation (MRI), service innovation (SRI), behavioral innovation (BHI), managerial innovation (MGI), NPD strategy (NPS), NPD support system (NSS), product portfolio& structure (PPS), NPD team (NPT), NPD tools (NTL), new product launch (NPL), concept generation and testing (CGT) as shown in Table I.

Step 5. Classify the attributes/criteria/parameters into direct (performance grows while measure increases) and indirect categories (performance grows while measure decreases). Table VI shows the classification of parameters into direct and indirect categories for the significant category – Product Innovation. It can be found that the up arrow (▲) is used for direct category while a down arrow (▼) is used for indirect category.

Table VI: Classification of performance measures into direct and indirect categories for the significant category – Product innovation (Sample)

Significant	Parameters	In Short	Max or Min
Product Innovation	Newness /Novelty/ Originality / Uniqueness	PDI1	▲
	Cost/pricing/Value for money	PDI2	▼

Step 6. Group the attributes/criteria/parameters as quantitative and qualitative measures Table VII, shows the classification of quantitative and qualitative measures for the significant category – NPD Strategy. For steps 5 and 6, the parameters were categorised based on the discussions with experts for the case organization.

Table VII: Classification of performance measures into qualitative and quantitative categories for the significant category – NPD strategy

Significant	Parameters	In Short	Qual or Quan
NPD Strategy (NPS)	Cycle time reduction	NPS1	Qual
	Competitive advantage	NPS2	Qual
	Reduction in cost	NPS3	Qual
	Fast-follower strategy	NPS4	Qual

Step 7. Absolute weight values 'wj' on a suitable scale (say 1 to 10) is assigned for each attribute/criterion/parameter reflecting the normative judgment of the decision maker. The experts assigned the weight values individually. For most of the performance measures, the weight values were same and only for few performance measures, significant differences were found between them. In such cases, the same was thoroughly discussed and the weight values were revised.

Step 8. Quantify the qualitative attributes using the scale of 1 to 10, where 1 means very low, 3 means low, 5 means medium, 7 means high, 9 means very high and 10 means excellent.

Step 9. Form the normalised performance matrix. The values for each attribute/criterion/parameter 'cj' are obtained based on the following conditions:

- Direct category (when performance increases while measure increases)

$$p_{ij} = \frac{e_{ij}}{\max(e_j)}$$

for each alternative 'a_i' related to attribute 'c_j'

- Indirect category (when performance grows while measure decreases)

$$p_{ij} = \frac{Min(e_j)}{e_{ij}}$$

for each alternative 'a_i' related to attribute 'c_j'.

Step 10. Obtain partial performance measure 'Z_{ij}' by multiplying relative weight values of attribute/criterion/performance indicator with each of its row members (alternatives), i.e., Partial performance of j^{th} attribute is given as:

$$Z_{ij} = p_{ij} \times \overline{W_j}$$

where (i = 1, 2, . . . I).

Step 11. Obtain the relative weight-age $\overline{W_j}$ for each attribute/criterion/performance indicator (c_j) (derived from AHP in Step 7).

Step 12. Obtain partial performance measure Z_{ij} by multiplying relative weightage $\overline{W_j}$ of attribute/criterion/performance indicator to each of its row members (alternatives), i.e., p_{ij} as: partial performance of j^{th} attribute: $Z_{ij} = p_{ij} \times \overline{W_j}$ (i = 1, 2 . . . I)

Step 13. Aggregate the partial performance measures for each alternative as: Total performance value (N_i) of alternative a_i is the sum of Z_{ij} : $N_i = \sum_{j=1}^{J} Z_{ij}$

Step 14. Rank the alternatives (a_i) in accordance with decreasing value of N_i Table VIII shows the performance summary for the case organization along with benchmarking organizations. Table IX shows the normalized and partial performances of the variables. Table X shows the performance of the elements with respect to all the alternatives.

Table VIII: Performance measures summary of case organization along with benchmarking organizations (sample)

Variables	NKPI	NPI	Element	RWPI	ABC	PQR	XYZ
Simultaneous / Concurrent	TEM3	▲	TEM	0.011	Very low	Low	Medium
Quality function deployment (QFD)	TOL1	▲	TOL	0.009	Very low	Low	Medium

N: Notation; NPI: Nature of performance indicators; RWPI: Relative weight-age of performance indicator; ABC: case organization; PQR&XYZ are the benchmarking organizations.

Table IX: Normalized and partial performances of the variables (Sample)

Variable	N	Normalized			Partial performance		
		NP	NP	NP	NP	NP	NP
Newness /Novelty/ Originality /	PRD1	0.78	1.00	1.00	0.02178	0.0280	0.0280
Cost/pricing/Value for money	PRD2	1.00	1.00	0.75	0.02100	0.0210	0.0157
DPI					0.581	0.710	0.970

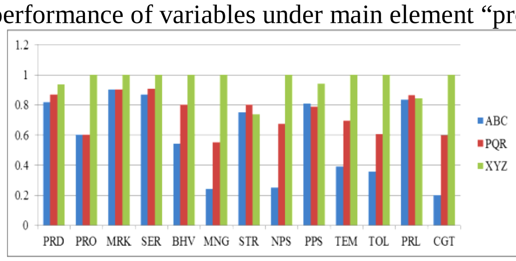
N: Variable in short; NP: Normalized Performance; PP: Partial Performance measure; DPI: Desirability Performance Index.

Table X: Performance of the main elements

Element	ABC	PQR	XYZ
PRD	0.820408	0.87102	0.935714
PRO	0.602977	0.602977	1
MRK	0.905226	0.905226	1
SER	0.87013	0.909091	1
BHV	0.541194	0.801209	1
MNG	0.242676	0.553345	1
STR	0.75	0.8	0.74
NPS	0.250945	0.672714	1
PPS	0.811307	0.788835	0.942215
TEM	0.392653	0.696327	1
TOL	0.358125	0.605745	1
PRL	0.833333	0.866667	0.845237
CGT	0.2	0.6	1

RESULTS AND DISCUSSION

Different tables shown in AHP-PVA methodology will help the ABC Company to understand the importance of each variable and key performance indices. For instance, in Table III, the principal vector describes the importance of each main-attribute with respect to the goal. In this case, the ABC Company is more concerned about the process innovation (PRO, PV=0.24), product innovation (PRD, PV=0.175) and market innovation (MRK, PV=0.158). Similarly, Table V establishes the relative importance of the key performance indices i.e. the different factors considered within the main-element – managerial innovation (MNG). In this case, the decision makers judged that the leadership innovation (MNG 1, PV=0.27), management strategy on innovation (MNG 3, PV=0.27) and motivation of people to innovate (MNG 6, PV=0.24) are more important among other key performance indices. Similarly, the relative importance of key performance indices under the different main- elements can be compared and assessed. The results of the PVA in Table X reveal that XYZ Company is highly rated in terms of IPD practices for the case situation considered, as the overall desirability index is much higher when compared to the rest of the alternatives. The overall results reveal that ABC Company is in third position in terms of overall adaptability of IPD practices in organization, which justifies its position in terms of sales. From the obtained results, which are shown in Table X, a graph depicting the performance of the alternatives for each main element is shown in Figure II. Similarly, partial performance of the variables under each element of the alternatives can be plotted. For example, the partial performance of variables under main element "product innovation" of the three alternatives is shown in Figure III.



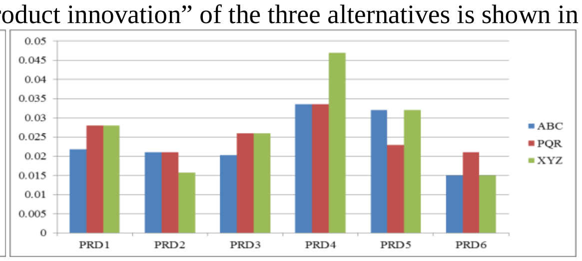


Figure II&III: Performance of the alternatives for each main element and variables under "product innovation"

Figure II will reveal that for all elements, XYZ Company is highly rated in terms of IPD practices compared to PQR and ABC companies. Figure III reveals that the key performance indices in product innovation category, for all the three companies have their own merit. Hence, the immediate target for the ABC Company is to compare with its immediate competitor i.e. PQR company and evaluate the merits and demerits. A brief analysis of key performance indices are reported in Table IX. Figure III reveals that the IPD variable for ABC is clearly lagging compared with the PQR Company. For instance, in the main element "product innovation" plotted in Figure III, key performance indices or variables like newness or novelty in the product (PRD 1), product enhancement (PRD 3), and use of technology (PRD 6) etc. Here, these key performance indices have got less rank from the decision makers during the pair-wise comparisons, which enabled ABC Company to perform less than the PQR Company in the product innovation category. On the other hand, for the other three key performance indices in product innovation, ABC Company performed better as compared to PQR Company. Therefore, it is important for ABC Company to analyze its performance from the analysis in order to explore the areas where it lags behind its competitors and make corrective action.

CONCLUSION

Managers in organizations spend most of their time to constantly evaluate the existing innovative product development (IPD) practices and striving to improve the performance of their IPD practices. One approach adopted is that of comparing current practice with that of other benchmarked organizations. In the present chapter, a case study is presented to demonstrate the utility of implementing IPD practices. The AHP and PVA algorithms were combined to prioritize the elements first and from which prioritization value of elements together with key performance indices were used to evaluate the performance of a system. This study provides fresh insight to fill some of the knowledge gaps in this area with particular focus on evaluating IPD performance from an organization perspective against the benchmarked organizations.

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Kalluri Vinayak did his B.Tech (Mechanical Engineering) from Jawaharlal Nehru Technological University, Hyderabad and M.Tech (Machine Design) from IIT Madras, Chennai and PhD from BITS, Pilani. He is having more than 12 years of teaching experience and currently working as Associate Professor in BML Munjal University, Gurgaon, India. Before joining BML, he was associated with BITS Pilani in the Department of Mechanical Engineering. He was also Warden and a nucleus member of Student Welfare Division (SWD) f**o**r four years in BITS Pilani. He has over 10 years teaching experience at under graduate and graduate levels. His areas of research interest are product development and mechanical system design.

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