

# A Computation Model for Planned and Functional Systems using Enterprise Information Technologies

E. Subramanian, C. S. Sanoj



**Abstract** - All the large scale and medium scale companies have the anticipation of obtaining long term benefits perhaps of short term financial losses, probable breakdown as well. For that Enterprise Information Technologies (EIT) put into service by many large scale and medium scale companies in an increasing number in the expectation of achieving long term benefits. EIT is a very costly and risky asset of Information Technology and the assessment is done based on the increase in the production and the reinforcement of corporate restructure through the business integration process. To work out this, we propose Analytical Network Process (ANP) to handle distinguished assessment of associated set of evident, critical and operational attributes. To illustrate the stability and the consequential administrative significance, we perform analyzes and carry out experiments with real-world data.

**Keywords** - Analytical Network Process (ANP), Enterprise Information Technologies (EIT), Enterprise Resource Planning (ERP)

## I. INTRODUCTION

Equally data processing become more and more costly to buy and sustain, many organizations gets demanding queries from investors and they demand their managers to provide better explanation for their organizations about this unease. This is predominantly factual for Enterprise Information Technologies (EITs). In general, EIT system costs millions of dollars and takes much more years to complete. Therefore, they want to be assessed from a calculated view. Nonetheless, an EIT systems also has a extensive collection of working level applications, and the nonexistence of operative use at this level which can every now and then cause system wide complications [5] [9]. For this reason, the project manager assessing an EIT system must also consider all the working issues to the better extent. Sadly, investigation effort is deficient in such a comprehensive analysis. To work out this, we propose Analytical Network Process (ANP) to handle distinguished assessment of associated set of evident, critical and operational attributes. It demands supply of utility weights based on the opinion from the organization decision maker. ANP process has the ability to handle inter level dependencies among attributes. So it mainly suits for assessment of EIT. Moreover, ANP has a worthy decision making tool than AHP. We evaluate the ANP model using the data taken from Payments Technology (PT).

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In the second design step, the utility weights from the ANP are measured in a full programming model, which selects a set of different theme to managerial and economic limitations. Important managerial insights can be derived from sensitivity analyzes with the above said two models.

This mechanism supports a hierarchical connection, by linking the top level management with a critical summary to working disputes. It includes tangible and uncertain Attributes in considering calculated and working requirements

When we compared to common data processing systems EIT sensibly has more area expertise problems which require more attention. An interior and exterior supply chain combination problem incorporates supply commitments, consumer significance, allotment policy, sharing system design and stock management. Thus to resolve the above stated problem EIT incorporates ANP which set right all those issues.

## II. LITERATURE SURVEY

EIT systems are bundled software systems that are finest system for companies with embedded business models. An EIT generally incorporate complete systems of an Enterprise Resource Planning (ERP) system. These systems supports for state-of-the-art supply chain planning abilities that facilitates overall development, transit, sales-force, repository and consumer associated operations, automated Business-to-Business (B2B) E-Commerce purchase with clients and dealers and having measures [7] which supports virtualization venture actions within the organization. Consequently this linkage demands an integrated process to speed up the large-scale and small-scale determination levels. With the above said firm integrated systems an assortment of preferences like, collectively with point-to-point or open interface measures [10] are possible. In addition to internal functions within an organization, these measures also enable B2B E-Commerce. B2B combinations facilitate the enterprise headed for acquisition development by trimming the acquisition costs. Besides, sophisticated B2B combination may combine the back end set up with supply chain partners to execute order planning.

This integration likely able to deliver better supply cost savings through international expansion. More numbers of prototypes have been explored and refined to deal with the planned validation of sophisticated manufacturing technology. Planned validation prototypes expand its boundary from simple weighted scoring technique to advanced resolution support systems. Data processing field provides a variety of approaches for an assessment that can be used for the evaluation of operational level problems. This data processing makes enormous impact on an organization so analysts are suggesting diverse aspects for evaluation [2].

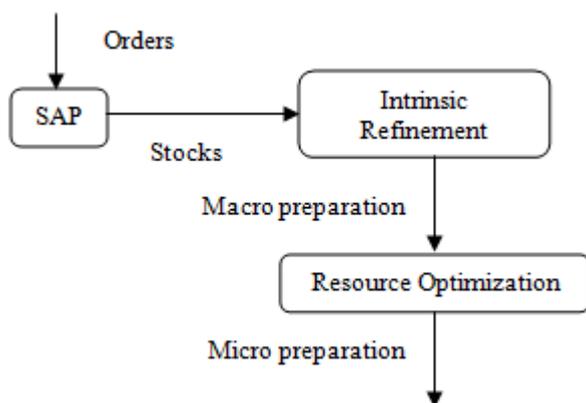


One aspect concerns the robust environment analysis of data processing systems. Earlier investigations on data processing systems comprises of Influences on manufacturing par unit, evaluation all the way through capacity, business effectiveness and consumer significance dealings, Return on Investment (ROI), trade and retail profits. For the analysis, the time limitations issues also taken in account. Another aspect of data processing systems is from an individual level, such as influence on an individual achievement which is measured by effort yield, modernism in the work, consumer fulfillment and administrative power.

### III. EIT APPROACH

#### A. EITs Architecture

PT regulates complicated international and multi-organizational buyer requirements via group of three firmly integrated systems illustrated in Fig. 1 comprises of: System Application and Products in data processing's (SAPs) ERP system, intrinsic refinement, and resource optimization. All orders are entered into SAP and also all feasible stocks are able to be seen by other data processing tools. This speeds up the intrinsic refinement in order to perform macro preparation so as to improve the operations. This information disseminated into resource optimization level to execute micro preparation which improves the manufacturing site throughput. Earlier, this micro level planning is fulfilled in the absence of improving organizational assets. Such levels of planning helps to visualize by what means an EIT system affords to a number of insubstantial profit like similarity and development of business processes and as well as substantial profit like cutback in the supply.



**Fig. 1. Enterprise Information Technology systems**

#### B. Validation issues faced by EITs

EITs face validation issues which overlap in two operational areas: planned systems validation and validation of IT systems. Planned system validation has single dependency dispute on conventional monetary fund allocation. Earlier feasible techniques such as reimbursement and ROI are inadequate for planned validation view.

### IV. ATTRIBUTES FOR PLANNED ASSESSMENT

EITs has a broad range of Attributes which needs precise concentration for the appropriate assessment, amongst those

numerous of them are insubstantial. These insubstantial Attributes may have superior control than substantial entities.

#### A. Attributes to be Measured

While assessing several planned problems using EIT and ANP, the managerial group must be strongly concerned about both monetary cost and execution plan, since it requires by EIT systems. For that reason, we took the subsequent attributes for planned attainment measure, strategy boundary, cost progression operation, data processing specifications along with cost. Scope of the EIT systems are measured with aforementioned attributes which addresses managerial communications among and not beyond the boundaries of the organization, synchronization of all issues far and wide in the organization and operation not beyond the particular functional areas

- *Planned Attainment Measure (PAM)*: Organization planned targets have been evaluated by using any of the following four major measures [4]. They are expenses, excellence, adaptability, and constraint based capacity. Each organization incorporates any one of these measurement to improve their assets. For instance, glass production firm gives significance to excellence over expenses
- *Strategy Boundary (SB)*: The planned attainment measures of an organization are dynamic in nature [1]. In realistic, all the influencing aspects affecting the planned targets frequently have a transition boundary in an interval amount of time. The significance level varied with heterogeneous aspects
- *Cost Progression Operation (CPO)*: Intuitively organization was sandwiched between tasks pertaining to cost and course of action. The cost progression operation framework incorporates five operations which includes, Layout configuration, Marketing, Utilities, Inter-connected and Intra-connected structures.
- *Data Processing Specifications (DPS)*: The requirements are formed as a array. Here the array shares the technical Attributes relevant to the EIT system
- *Cost*: Many segments in the organization pertain to substantial factor of cost. The managerial group must pay attention to cutback the cost as it takes the majority portion of the monetary allotments. The significant Attributes include primary venture and operational costs

#### B. Connections among Attributes

The connections among the arrays of insubstantial Attributes are depicted in the below Fig. 2. In the figure the ordered connections are represented among SB, PAM, CPO and EIT arrays which are easy to validate. After the resolution of EIT it transferred to DPS and PAM. PAM is interconnected with SB and CPO. Once the operations completed in CPO then the order passed to the EIT arrays. Finally all comes to EIT Auxiliary which substantiates the weights supplied to the EIT arrays.

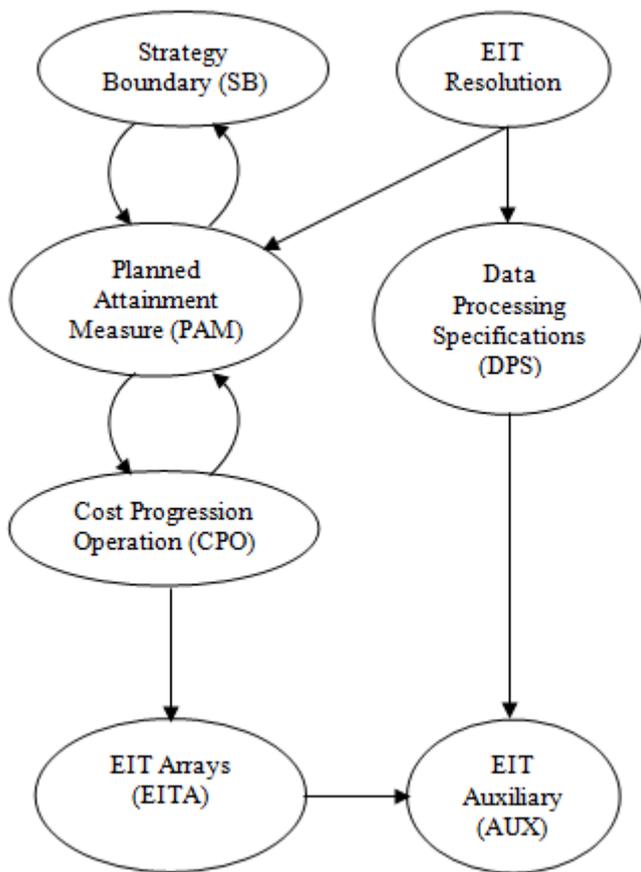


Fig. 2. Arrays of Insubstantial Attributes

Since the specific planned action varies its course of action beyond its boundaries these connections deserves automatically. Contrastingly, insubstantial planned elements significance varies at regular intervals. Our second correlation is coupled with PAM and SB. Proportionately all PAM attributes show distinctive implications on all SB attributes. Besides that, all SB attributes also show distinctive implications to the PAM attributes. At last, from the third interconnection, we came to the determination that organization does not solely be connected with an EIT dealer. Approximately organization needs to purchase extra EIT from the dealer to fulfill its tradition, topographical conditions. Thus, this dispute plays an enormous role for the interstate network compatibility.

C. Assessment Techniques Representation

The assessment techniques involved are, Knowledge Improvement Exploration (KIE), Knowledge Engineering and Resolution design. All the above techniques can be compared based on several attributes.

Amongst all techniques, ANP interpretation gains top rank. Although there are some deficiencies, such as ranking review and the number of judgments required at first, but the ANP interpretation is not comparatively complex against other techniques. The merits are,

- 1) Helps to improve the organization understanding and gives clarity about the designing technique
- 2) Has a capability of associating quantitative and quality aspects into the decision making process

- 3) This interpretation also combined with KIE and Resolution design techniques to acknowledge the assessment
- 4) Attributes taken or used for evaluation are arranged in the form of hierarchical framework which easily solves the complexity
- 5) Judgments are done using a atomization in order to reduce the errors occurring in the decision making
- 6) Recent investigational analysis verifying and validating this interpretation as its user friendly from the decision maker's opinion
- 7) Because of its structure this interpretation provides a satisfying solution to all the collaborators and this can be used as a concurrence architecture tool if implemented properly

ANP computed as follows,

- Step -1. Collect all identical connection attributes that exploiting the determination
- Step -2. Compute context utility paths of all attributes
- Step -3. Construct the 2D grid with all utility paths of attributes obtained in step-2 and distribute the values in regular interval
- Step -4. Estimate the auxiliary weights for EIT from the obtained 2D grid in step-3.

V. ANP INTERPRETATION

A. Fundamentals of ANP Interpretation

Calculation of ANP initiates accumulation of identical collection attributes, computation of context utility paths, construction and distribution of 2D grid and estimation of auxiliary weights. After the creation of the determination system all the aforesaid calculation carried out. The determination system is made up of multitude of arrays. As a consequence the organization wants to discover the attributes combination and association between them from the multitude of arrays. The details of the computations are,

➤ *Accumulation of Identical Collection Attributes:* Two kinds of Identical Breakdown (IB) are acquired from the executives of the organization. The foremost kind results the inter-array breakdown. The subsequent kind is inter-element breakdown, an attributes within each constrained array identically correlated towards all guiding array elements. Thus, the number of IB can be given by (1),

$$\sum_j (|J| (|J'| - 1) / 2) + \sum_{J \in J'} (|K_{J'}| (|K_{J'}| - 1) / 2) * U_{JJ'} \tag{1}$$

➤ *Computation of Context Utility Paths:* The context utility paths of all attribute have been computed by IB got from the earlier step. This computation is done by solving the following Eigen value problems given in (2) as follows,

$$\left. \begin{aligned} A^{Jj} W^{Jj'} &= \lambda^{Jj} W^{Jj'} \quad \text{for all } J_j, j \in J \\ A^{J,Kj'} W^{J,Kj'} &= \lambda^{J,Kj'} W^{J,Kj'} \quad \text{for all } K_{j'} \text{ and } J, j' \in J \text{ such that } U_{JJ'} = 1 \end{aligned} \right\} \tag{2}$$

Where  $A^{J'}$  corresponds to the IB array comparisons pertained to  $J_{J'}$  with respect to controlling array  $J'$ , and  $A^{I,Kj'}$  is the IB Attributes in array  $J$  with respect to the controlling factor  $K_{J'}$ . Correlated Eigen vectors are specified as  $W^{J'}$  and correlated largest Eigen values are specified as  $\lambda$ .

➤ *Construction and distribution of 2D grid:* Inevitably, ANP demands the formation and distribution of 2D grid. This grid has been formed by collecting all identical connection attributes that exploiting the determination and computes the context utility paths of all attributes which specifically indicated as  $W^{I,Kj}$ , and stated as  $[W^{I,Kj}]$ , corresponding to each array pair  $J, J_j, \in J$  for which  $U_{J_j} = 1$ . All values of this 2D grid distributed for its consistency by expanding the elements corresponding to array  $J$  in  $W^{I,Kj}$ .

➤ *Estimation of Auxiliary weights.* Raise the achieved 2D grid to exceptionally big factor. Finally, the auxiliary weights are computed by (3) as follows,

$$W_F = \lim_{p \rightarrow \infty} (W_I)^p \tag{3}$$

Where  $W_F$  and  $W_I$  corresponds to the last and first 2D grid, accordingly.

Attributes in array  $J$  weights attuned with the aim of acquiring  $W^{I,Kj}$ . From Fig.1, the multitude arrays Aux weights are generated. The guiding elements have a high impact on correlated factors of the multitude arrays. So the interpretation seeks distribution of values. The Table - I shows the ANP auxiliary weights as follows,

Table – I ANP Auxiliary weights

Weights / Aux	W1	W2	W3	W4	W5
Aux1	0.18	0.18	0.19	0.20	0.22
Aux2	0.17	0.16	0.16	0.16	0.16
Aux3	0.18	0.18	0.18	0.17	0.17
Aux4	0.16	0.16	0.16	0.16	0.15
Aux5	0.14	0.14	0.13	0.13	0.13

VI. RESULT ANALYSIS AND DISCUSSIONS

To substantiate our proposed ANP interpretation, we took a resolved set of circumstances for our determination to demonstrate and emphasize our interpretation. Our analysis results mainly focus attention on,

- 1) Accuracy of the determination system and tools used for analysis,
- 2) Verify the outcome magnitude of our analysis with earlier determination of the organization

With the help of the following categorization, we justify our assessment and analysis. The categorizations are,

- *Competency Recognition:* Mr. George Davidson, who was a Solution architect at PT, assists us to assess the consciousness stated in our interpretation. With his acquainted skill in corporate values he guided us to optimize our determination system interpretation
- *Attributes Discrimination:* The attributes affecting the determination are specified by PT intending us to find the solution. Ultimately we found two attributes discriminating the determination system of PT. They are perpetuation and inconstancy. So we demand PT to assert on these attributes by changing the dominance of perpetuation on an regular interval

➤ *Alterations Constructed:* Based on our observation, we did some alterations to the taken determination system. We include, exclude and made gap in the determination system. The alterations constructed are illustrated in Table – II as follows,

Table – II Alterations constructed on the Determination System

Item	Addition	Drop	Splits
Arrays	None	None	None
Connections	None	PAM to SB	None
Attributes in ITR	Response time	Perceived value	None
Attributes in EIT	None	Engineering	Production planning

➤ *Assessment Amplification:* On the basis of the alteration constructed on the determination system the amplification did with our interpretation. The survey part took with the representatives of PT. In the survey we asked the questions pertaining to the attributes that affects the determination system. The answerer able to make select identical attributes that affects the determination system easily on the basis of the familiarity with the organization. Collectively, the ANP Auxiliary weights to the magnitude of Auxiliary to the attribute Support has been illustrated in Fig. 3 as follows,

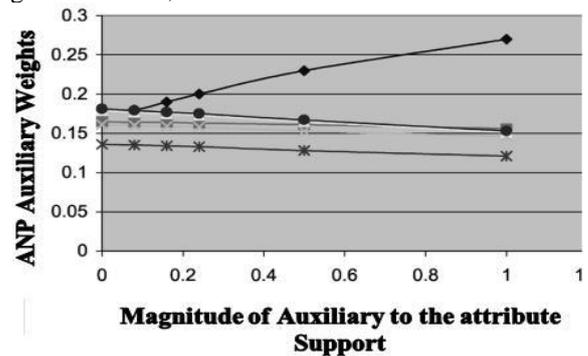


Fig. 3. ANP Fig. 3. Auxiliary weights to the magnitude of Auxiliary to the attribute Support

VII. CONCLUSION AND FUTURE ENHANCEMENT

EIT systems are witnessed solution to integrate the information and its processing, which are functionally and topographically distinct. In this proposal, we conferred the issues of organizing a tremendous degree assessment of EIT system. When applying our procedure, significance carried out for management. At First, the ANP method simplifies the functional components within the organization and the intensity analysis within the organization. The managerial group incorporates our ANP method for assessment means they must ensure the operational level problems at micro level. Second, ANP also offers a controlled breakdown method to deal with broad collection of Attributes, as a replacement entirely on perception to assess all the insubstantial Attributes. To finish, Eigen-vector calculations done by the conventional method, further all ANP calculations completed on a managerial tool with the help of a spreadsheet.



There are four possibilities for future investigation. At first, our ANP interpretation was limited to its distinct magnitude and patterns. Second, our ANP interpretation treated for operational problems, but it's precisely meant from a superior managerial viewpoint. Therefore, the low level users cannot access the functional disputes. Feasibly, assessment can be done as an isolated subsequent level ANP analysis to supply inputs.

Third, our ANP interpretation stated here might be enhanced to incorporate multiple periods of time and topographies. At last, our sensitivity examination reveals assured achievable inclination that must be further explored with complete simulation studies.

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