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Interpretive Ranking Process

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Abstract

Ranking of variables in any context is a central concern of the management process and decision-making. For example, the causes leading to defects/quality are to be ranked to identify crucial causes to be controlled on a priority basis; actions planned are to be ranked with respect to their influence/impact on the performance areas (or KRAs – Key Result Areas) for resource allocation and prioritization. The management process at large is concerned with selectivity and prioritization and is treated at the extreme either based on intuitive judgment or rational choice process. There are strengths and limitations of both the extreme approaches and there is a growing trend to synthesize and balance the two extremes in decision-making. However, in either of the approaches the interpretation is not explicit and there might exist some weaknesses on the front of knowledge creation, storage and utilization processes.

Some attempts in past have been made to develop interpretive models of decision-making such as sense making, mental models, organizational culture and so on. However, still there is lack of a ranking process that is rooted in interpretive perspective. This paper presents an 'Interpretive Ranking Process (IRP)', which uses Interpretive Matrix as a basic tool and pair comparison of interpretations in the matrix. This results into interpretive logic – knowledge base and a dominance matrix. All the dominance relationships and interpretations can be diagrammatically represented in the form of an 'Interpretive Ranking Model'. The process is illustrated by an example of SAP-LAP (Situation-Actor-Process-Learning-Action-Performance) interactions (Sushil, 2000).

Keywords: decision-making, interpretive ranking process, knowledge base, SAP-LAP

Introduction

The central concern of any managerial decision-making is ranking of alternative choices with reference to some criteria or some key result areas (KRAs). Similarly, ranking plays a vital role in competitiveness assessment as well. It is either done by a traditional approach using intuitive process or by following analytical process as a scientific approach. Some authors have pointed out regarding the utility of intuitive decision-making. An interview based study of experienced professionals in US context, reported by Burke and Miller (1999), brings out the utility of intuitive decision-making stating the types of workplace situations in which intuition is used. Patton (2003) highlights the role of intuition in decisions in extraordinary circumstances in which decision leaders have to make decisions without all the data. A holistic understanding of decision-making incorporating its complexity and messiness is proposed by Hampson (1995) in the form of a model. This model includes interpretive schemes of more and less powerful members, goals and strategies, structures and systems, power relationships, and the external environment. Creighton (2001) has brought out the limitations of the rational choice theory of decision-making in the context including dynamic and rapid change, open systems, and major uncertainties and discontinuities. According to him, in such complex decision situations interpretive models of decision-making are found to be more useful. However, even though the interpretive models address the issues of interpretation and meaning, they still fail to adequately address the knowledge creation process.

Intuitive Process

Some of the limitations of the intuitive process of ranking/ decision-making are:

- It may not be able to consider all possible interactions.
- It may lead to cognitive overload and the decision-making may get influenced by biases.
- The process is not transparent.
- The validity of the decision is questionable.

Rational Choice Process

Some of the limitations of the rational choice process of decision-making are:

- It is based on rational decision-making, whereas the reality is placed under bounded rationality (Simon 1957). The information available may not be complete or may be imprecise.
- The final decision is based on elegant mathematical manipulation, which may be black boxed in the decision support system and thus may be difficult to be interpreted. Thus, despite the well defined logic, the process may not be transparent to the decision-maker.
- Most of the approaches of Multi-Criteria Decision-

Making (MCDM) such as Analytic Hierarchy Process (AHP) (Saaty 1977) are based on weightage of criteria/ attributes whose values have a great bearing on the ultimate rankings. The justification for the weightages is difficult to be validated.

- These approaches require high technical skills on the part of the decision-maker and usually require integrated software packages to support the decision.
- The process is weak in an interpretive sense.
- The scaling of the scoring method is questionable and at times it is difficult to score on the scale. For example, in case of AHP a scale of 1-9 is used. The interpretive logic of choosing a score, such as 3, 5, 7 or 9, while comparing two variables is not transparent & remains as tacit knowledge with the expert.

This paper brings out the limitations of both the intuitive and rational choice processes of decision-making and makes a case for interpretiveness in the decision-making process with an emphasis on the knowledge creation and management processes. The paper gives the steps of the basic structure of an 'Interpretive Ranking Process' (IRP). This process is illustrated in the context of SAP-LAP framework (Sushil 2000, 2001) by two ranking situations, viz. ranking of actors w.r.t. their roles in processes, and ranking of actions w.r.t. their impact on performance.

Interpretiveness in Decision-making

Creighton (2001) presented an in-depth critique of the rational choice model and presented a critical review of decision-making from an interpretive perspective. Simon (1947, 1957, 1997), who propounded the rational decision-making model, realized its limitations and later formulated a more pragmatic principle of "bounded rationality". According to this concept, the information passes through various organizational and cognitive filters or bounds that filter the information before it reaches the decision function. Thus, the information available is to be interpreted in a proper perspective within the given bounds. Managerial and social systems are complex in nature having counterintuitive behavior (Forrester 1975), non-linearity and dynamics (Sushil 1993). Thus, it requires to use multiple sources of information including mental data base, which is rich in information content (Forrester 1987). This highlights the requirement and significance of an interpretive process of decision-making.

This paper brings out the limitations of both the intuitive and rational choice processes of decision-making and makes a case for interpretiveness in the decision-making process with an emphasis on the knowledge creation and management processes.

The interpretive approach to decision-making has been used by a variety of authors, who use different constructs. The concept of mental models is used by Senge (1990). The mental models are primarily governed by the mental data base which contains knowledge about the systems. In this context it is important to understand, that the apparent gap between the expected and actual system behavior is due to the real gap between the understanding of observed structure and generation of expected behavior (Forrester 1987). Some other dominant constructs of interpretive approach are: organizational culture (Schein 1992), sense making (Weick 1979, 1995), managerial frames (Schrivastava and Mitroff, 1983), garbage can model (March and Olson, 1976), theories in use (Argyris et al., 1985), critical thinking and argument mapping (Gelder 2007; Gelder and Lewis 2006), patterns in management (Mintzberg 1978, 1989) and so on. The interpretive approach has been adopted by many more authors in a variety of contexts; some prominent ones are: Argyris and Schon (1978), Dougherty (1989), Schon (1983), and Walsham (1993, 2006).

The interpretiveness in management is also highlighted in the context of knowledge management by Nonaka and Takeuchi (1995), and Thompson and Walsham (2004). In this paper, an attempt is made to integrate the interpretive approach to decision-making with knowledge management so that the knowledge created can be utilized in future decisions in the similar domain.

Interpretive Ranking Process

Using the strengths of both the intuitive process and the rational choice process of decision-making and complementing the limitations of each one by the other the interpretive ranking process is evolved. The IRP takes advantage of the analytical logic of the rational choice process and couples it with the strengths of the intuitive process at the elemental level. It is rooted into the strengths of the paired comparison approach to minimize the cognitive overload (Warfield 1974; Saaty 1977). At the same time, it overcomes the weakness of the paired comparison approach the way it is applied in rational choice models, such as Analytic Hierarchy Process (AHP) (Saaty 1977). In AHP, an expert gives the judgment about the importance of one element over the other in the pair along with its intensity, but the interpretation of the same is left in a tacit manner with the expert, thereby making the interpretive logic of the decision opaque to the implementer. In IRP, the expert is supposed to spell out the interpretive logic for dominance of one element over the other for each paired comparison. Further, IRP does not require the information about the extent of dominance, which is difficult to be interpreted and is questionable in terms of validity. It makes an internal validity check in terms of the vector logic of the dominance relationships in the form of a dominance system graph. In this section, the steps of a basic formulation of IRP are presented with a discussion on the possible scaling-up of this process.

Steps of the Basic Process

The steps of the Interpretive Ranking Process (IRP) are as follows:

I Identify two sets of variables – one to be ranked with reference to the other, e.g. Alternatives and Criteria, Actions and Performance, Actors and Processes, & so on.

II Clarification of contextual relationship between the two sets of variables.

III Develop a cross-interaction matrix between the two sets of variables.

IV Convert the Binary matrix into an Interpretive matrix (Sushil 2005) by interpreting the interactions, i.e. '1' entries in various cells.

V Convert the Interpretive matrix into an Interpretive Logic of pair-wise comparisons and Dominating interactions matrix by interpreting the dominance of one interaction over the other.

VI Develop ranking and interpret the ranks in terms of dominance of number of interactions.

VII Validation of ranks derived.

VIII Displaying ranking diagrammatically in the form of an 'Interpretive Ranking Model'.

IX Decision about ranks with interpretation and recommendation for action

X Knowledge Management for further use

The steps of the Interpretive Ranking Process are diagrammatically shown in Figure 1. These steps are illustrated with reference to the case example of ABB India (Sushil 2009) as given in Appendix I. There are two illustrations provided: one for ranking of 'Actors' w.r.t. their roles in 'Processes' and the other about ranking of 'Actions' w.r.t. the 'Performance areas'. Thus, the basic decision questions for ranking in these two cases are:

- ❖ Which actor has a more dominant role in all the processes put together?
- ❖ Which action has more dominant influence/impact on various performance areas?

The IRP takes advantage of the analytical logic of the rational choice process and couples it with the strengths of the intuitive process at the elemental level.

The ranking of 'Actors' w.r.t. 'Processes' is referred while explaining the steps of the IRP.

Step I : Identification of Variables: The first step in the process of ranking is to identify two sets of variables, i.e. one set of variables that are to be ranked and the other set of reference variables. For example, one set would comprise of the alternatives to be ranked, and the other set would comprise of the criteria that are to be used for ranking the alternatives. In the example of ABB India, the ranking set consists of 'actors' and the reference set consists of 'processes' as shown in Exhibit 1 in Appendix I. There are four actors, i.e. A1, A2, A3 and A4 and four processes, i.e. P1, P2, P3 and P4. The decision problem is designed in terms of ranking of actors w.r.t. their roles in processes.

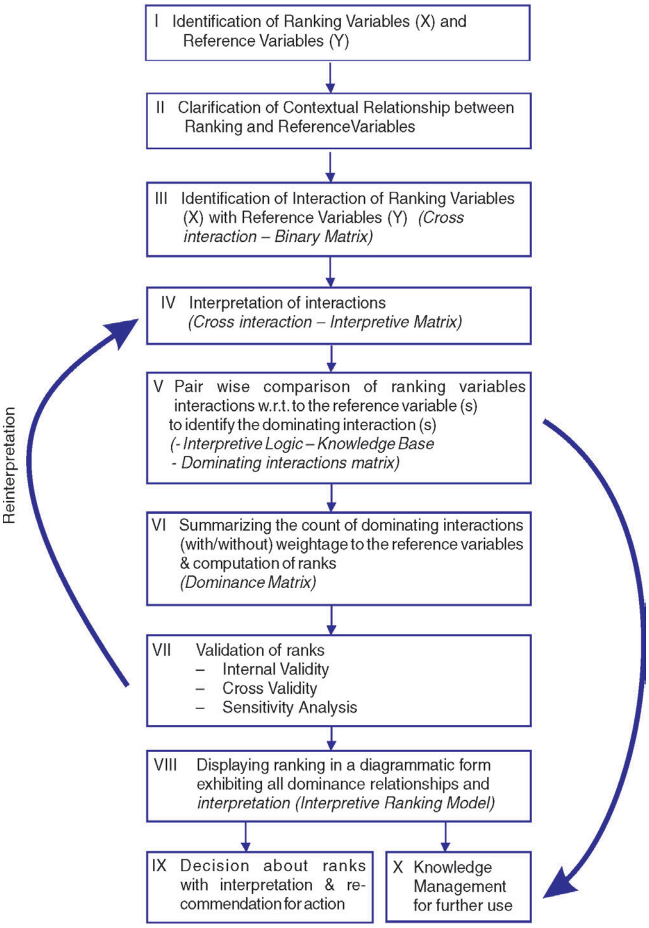

Figure 1: Interpretive Ranking Process

Step II: Contextual Relationship: Once the variables are identified, the next step would be to clarify the contextual relationship between them. For example, in case of ABB India, the contextual relationship is the 'roles played by various actors in different processes'. The actor(s) playing more dominant role(s) will be ranked higher.

Step III: Cross-interaction of Variables: The relationship/deployment among the two sets of variables, such as 'actors' and 'processes' or 'actions' and 'performance' can be represented by a cross-interaction matrix, as shown in Exhibit 2(a). The cross-interaction of variables can be represented as a binary matrix: '1' representing a relationship between the pair of variables and '0' representing no relationship (Hill and Warfield 1972). In some cases all the pairs of interactions might exist, thereby making the cross-interaction matrix as a 'unit matrix'.

Step IV: Interpretation of Interactions: The cross-interaction – binary matrix can be converted into a cross-interaction – interpretive matrix (Sushil, 2005) by interpreting the interactions with entry '1'. That means, all the possible interactions between the pair(s) of variables are to be interpreted in terms of the contextual relationship. For example, in case of the 'Actor x Process' matrix the interpretation is done in terms of the roles of actors in various processes as shown in Exhibit 2(b). The interpretive matrix becomes the basic data that need to be compared for the purpose of ranking of the variables.

Step V: Pair-wise Comparison: The interpretive matrix is used as a base to pair compare the ranking variables w.r.t. the reference variable(s) one by one. For example, in the ABB India case, the actor A1 is compared with actor A2 w.r.t. various processes P1, P2, P3 and P4 respectively and the interpretive logic of dominating interaction between A1 and A2 w.r.t. different processes is recorded in the Knowledge base, as shown in Exhibit 3. It may be interesting to note that, in a paired comparison, the ranking variables are not directly compared; rather their interactions w.r.t. the respective reference variable(s) are compared. For example, in the case under consideration, the roles of actors A1 and A2 w.r.t. different processes are compared rather than comparing A1 and A2 directly. All the dominating interactions are summarized in the 'dominating interactions matrix' as shown in Exhibit 4. In this case, the actor A1 is dominating actor A2 in processes P1 and P2, whereas it is being dominated by A2 in processes P3 and P4.

> ***In IRP, the expert is supposed to spell out the interpretive logic for dominance of one element over the other for each paired comparison.***

Step VI: Preparation of Dominance Matrix: The numbers of dominating interactions are summarized in the form of a dominance matrix, which gives the number of cases in which one ranking variable dominates or being dominated by other ranking variable. For example, in Exhibit 5 the dominance matrix of actors w.r.t. processes is given in the case of ABB India. The concept of dominance matrix is taken from the fuzzy set techniques (Allay et al. 1978; Bellman and Zadeh 1970). The sum of rows gives the total number of cases in which the respective ranking variable(s) dominates all other ranking variables. The sum of a column indicates the total number of cases in which a particular ranking variable is being dominated by all other ranking variables. The difference of number dominating in column 'D' and corresponding number being dominated in row 'B' gives the net dominance for a ranking variable. The positive net dominance would mean that the concerned variable has more numbers dominating than being dominated, whereas the net negative dominance would imply that the concerned variable is being dominated in more number of cases than dominating other variables. The variable having net positive dominance in maximum number of cases is ranked I followed by lower number of dominance relationships. The variables with more negative net dominance will be ranked lower as these are being dominated more by other variables. For example, in Exhibit 5, the actor A2 has highest net positive dominance and is ranked I, the actor A1 is ranked II with net positive dominance of 1, the actor A4 is ranked III with net negative dominance of -2, and the actor A3 is ranked IV with net negative dominance of -5. The sum of all net dominances for various variables should come out to be zero. This can be used as a cross-check to validate the dominance relationships.

In the examples provided here, the number of dominances are counted without any weights. However, if the weights are significantly different, a weighted sum of dominances can also be obtained. In general, it is proposed to avoid the use of weights, as this is difficult to be justified/validated.

Step VII: Validation: The ranks so obtained by the dominance matrix are being validated as discussed in a separate section. The process of validation is a process of confidence building in the ranks obtained.

Step VIII: Interpretive Ranking Model: The ranks obtained are diagrammatically represented in the form of an 'Interpretive Ranking Model". This model displays the final ranks of the ranking variables. For example, Exhibit 6 gives the ranks of various actors w.r.t. their roles in different processes. The arrows in the diagram represent the reference variables in which cases a particular ranking variable is dominating over the other ranking variable. In Exhibit 6, the dominating roles of various actors over other actors regarding different processes is depicted. For all the actors, the numbers dominating and numbers being dominated are summarized within brackets. It also interprets how each actor is influencing various processes.

Step IX: Recommendation for Action: Based on the ranks, as interpreted in the Interpretive Ranking Model, the decision about the preferred alternative(s) is to be made. The interpretation about this decision will generate the recommendations for action.

Step X: Knowledge Management: The interpretive logic – knowledge base will be useful in not only interpreting the decision but also for knowledge management for further use. This knowledge base will be available as the starting point for future related decisions and can be upgraded based on the additional variables and new learning about the relationships.

Scaling-up the Process

The basic process, presented in the previous section, can be scaled-up to cater to the complex requirements of a variety of the ranking problems. Some possible directions for the scaling-up the process are enumerated as follows:

Using Multiple Interest Groups/Experts: In case of complex decisions, involving multiple experts/interest groups such as policy decisions, the bias can be minimized by repeating the steps IV and V separately for each interest group or expert. The multiple interpretive logics can be synthesized to get an overall dominance matrix either based on consensus building or as an aggregation of the matrices for various experts.

Hierarchical Application: The ranking using interpretive ranking process can be done hierarchically as well using various sets of matrices. In this paper, the hierarchical application is not illustrated.

Mixed Formulation: In many ranking problems, the reference variables are mixed in nature, i.e. some are qualitative and some are quantitative. In such a situation, a mixed formulation of IRP may be used. Since the ranking is based on dominance relationships for each pair of ranking variables for a reference variable, it can be done interpretively for qualitative variables and quantitatively for quantitative variables. The mixed dominance relationships for various pairs can be easily aggregated in the form of the dominance matrix.

Upgradation of Knowledge Base: The knowledge base, as created in step V, can be upgraded with dynamic application of the ranking problem. This would require process and tools for upgradation of the knowledge base in a systematic manner.

Illustration

The proposed Interpretive Ranking Process is illustrated with the help of a case example of entry strategy of ABB India with the liberalization of the power sector in India to allow industry to have their Independent Power Plants (IPP) keeping focus on Technology Management. This generated enough market potential for ABB to consider India as a major expansion possibility. The SAP-LAP analysis (Sushil 2000) of this case is reported in Husain and Sushil (1997), which is further developed in terms of SAP-LAP linkages in Sushil (2009). The illustration of IRP for this case is exhibited in Appendix I. The basic SAP-LAP elements for this case are shown in Exhibit 1. The context of the case is Electrical power generation and distribution technology leader in the making through technological pioneering. The key actors in the case are: CEO of ABB (Parent Company), ABB India's Management, ABB India's Employees, and Government of India, who play crucial roles in the strategic processes, such as Technology and Business Strategy Alignment, Mergers and Acquisitions, Backward Integration, and Offering Technological Solution to Customer. The recommended strategic actions are: Technology Management as Core Function, Core Competence Building Agenda, Backward Integration Strategy, and Develop in-house R&D so as to achieve performance on the fronts of: Sustainable Competitive Advantage, Customer Satisfaction, and Dependence on Imported Technology.

The basic process presented here can be scaled-up to cater to the complex requirements of a variety of the ranking problems.

Two matrices from the SAP-LAP analysis of this case, i.e. 'Actor x Process' and 'Action x Performance' are selected here in Exhibits 2 and 7 respectively. These are used as base data for illustrating further steps of IRP in two separate examples. The final interpretive ranking models for these two examples are shown in Exhibits 6 and 11 respectively. The internal validity of the two ranking models is portrayed in terms of Dominance system graphs in Appendix II & III respectively.

The ranking model shown in Exhibit 6 interprets the roles of different actors in the strategic processes. It also clarifies the dominating roles played by various actors, which would be helpful in developing an actor centered approach for improving the effectiveness of these processes. Similarly, the ranking model shown in Exhibit 11 interprets the influence of key strategic actions on the performance. It would be helpful in setting strategic priorities in enhancing the performance in key areas.

Validation

Since the ranking process is rooted in interpretive logic, the process of validation would also be predominantly interpretive in nature. The validation of Interpretive Ranking Models will have multiple points of contact for validation to generate confidence in these models; some important ones are highlighted as follows:

i. *Validating Model Structure*

The model structure is to be validated in terms of variables and interactions. The critical questions that need to be answered for validating model structure are:

❖ *Whether all relevant variables are included?*

All the ranking and reference variables should be reviewed to examine that all relevant variables are included. This would require a structured walkthrough for the cross-interaction matrix.

❖ *Whether the interpretation of interactions is correct?*

A structured walkthrough is to be made through the cross-interaction interpretive matrix to examine the correctness of the interpretations.

❖ *Whether the interactions are rightly assessed?*

The dominance relationships from 'dominating interactions matrix' can be portrayed in the form of system graphs for all the reference variables separately. The flow of diagraph should be in one direction and there should be no feedback loop/cycle in the system graph. The feedback loop does not indicate clear dominance relationships. For example, the dominating interactions of various actors for different processes, as depicted in Exhibit 4, are portrayed in Appendix II, and the dominating interactions of various actions for different performance areas, as depicted in Exhibit 9, are portrayed in Appendix III. In both the cases, the dominance relationships in all the system graphs are unidirectional with transitive relationships, thereby internally validating the assessment of paired comparisons.

ii. *Cross-Validation of Dominance*

The cross-validation of the Dominance matrix may be carried out in two ways:

- The summation of all the net dominances for all the variables is zero.
- The Dominance matrix may be derived by

obtaining interpretations from more than one expert and the rankings obtained may be cross-checked.

iii. Gap in the Dominance Weights

If there is a gap of only '1' in the dominance weights of two alternatives than the ranking would be sensitive to the judgment. If the dominance weights have wider gaps, the ranking is supposed to be robust and will not get affected with minor variation in the judgment about dominance.

iv. Sensitivity Analysis

In case of weights given to the reference variables, the extreme weights may be given – the variable having lowest weight may be given highest weight and *vice-versa* and the dominance matrix may be re-computed. This will help in assessing the sensitivity of the weights of criteria.

v. Validating by Self-interaction Matrices

The ranking of any element can be cross-examined by corroborating the relationships portrayed in the self-interaction matrices (Hill and Warfield 1972). For example, ranking of 'actors' can be validated by comparing it with self-interaction of various actors and then generating the hierarchy.

vi. Validating Implications

The ultimate validation of the rankings would be by way of real life implementation and answering the question:

❖ *What are the real life implications of the ranking?*

Critique

The critique of the proposed Interpretive Ranking Process is presented here in terms of its major strengths and significant limitations. These limitations would be overcome, to some extent, with more innovative application of the proposed methodology in individual cases.

Strengths

1. It is easy to compare the impact of interactions rather than the variables in abstract sense. The interpretation of interactions would facilitate comparison.
2. It is comparatively easy to judge the dominance of one interaction over the other rather than the extent of dominance.
3. It is based on the strength of paired comparison as it does not create any cognitive overload.
4. It is not necessarily dependent on weightage of criteria, which is a debatable issue in MCDM methodologies.
5. It can be used to rank any set of variables with reference to the interacting variables, e.g. Actors and Processes, or Situation and Actors. In the pair of variables under consideration, the evaluation can be done both ways, e.g. to rank situation with reference to interaction with actors, or to rank actors with reference to interaction with situation variables.
6. Multiple interest groups can be involved for evaluation purposes to counter the bias in evaluation.
7. It is simple to implement without requirement of elaborate software resources.
8. The knowledge created during the ranking process can be stored systematically as a basis for future decision-making.

Limitations

1. It is based on interpretive and judgmental processes and at times may be highly subjective.
2. It usually treats all the criteria equally ignoring their relative importance, as given in the illustration here. However, this limitation can be overcome by assigning ordinal weights to various criteria and carrying out sensitivity analysis. But this may complicate the process to some extent and would require justification for the weights assigned.
3. It is difficult to be validated in terms of objective validation tests.
4. It is difficult to interpret a matrix of size beyond 10x10 as the number of paired comparisons would exponentially increase, and thus only modest sized problems can be effectively implemented with this process.

Conclusion

The ranking process that is rooted in the interpretive logic is presented in this paper as a first attempt and thus kept simple in the illustration. The scaling-up of the process relating to multiple interest groups and hierarchical application are only introduced and not dealt in detail so as to keep the concept in manageable limits. It may act as a stepping stone in enhancing the interpretiveness in the decision-making thereby making the logic of the decision more transparent. This will also be helpful in linking the decision-making with knowledge management. The future developments might be addressed in understanding the use of weights of reference variables, hierarchical structure of the decision problem, interpretation by multiple interest groups, combination of interpretive and quantitative evaluations, application in large size problems, and dynamic evolution and application of knowledge mapped through IRP.

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Appendix I

Illustrative Case of ABB India (Sushil 2009; Husain and Sushil 1997)

Exhibit 1: Variables of SAP-LAP in Case of ABB India

Components		Variables
Situation	External	S1–Stiff Competition S2–Opening up of Opportunities
	Internal	S3–Improved Financial Health S4–Strong Technology Base
Actor	Internal	A1–CEO of ABB (Parent Company) A2–ABB India's Management A3–ABB India's Employees
	External	A4–Government of India
Process	Internal	P1–Technology and Business Strategy Alignment
	External	P2–Mergers and Acquisitions P3–Backward Integration P4–Offering Technological Solution to Customer

Learning	L1*– Technology Policy L2*– Technology Development L3*– Innovation Culture L4*– Global Image L5* – Technology Absorption
Action	A1*– Technology Management as Core Function A2* – Core Competence Building Agenda A3* – Backward Integration Strategy A4* – Develop in-house R&D
Performance	P1* – Sustainable Competitive Advantage P2* – Customer Satisfaction P3* – Dependence on Imported Technology

Exhibit 2: Cross-interaction Matrix 'Actor x Process' (ABB India)

Contextual Relationship: *Roles of actors in various processes*

(a) Binary Matrix

Actor		P1 (Internal)	P2 (External)	P3 (External)	P4 (External)
Internal	A1	1	1	0	0
Internal	A2	1	1	1	1
Internal	A3	0	0	0	1
External	A4	0	1	0	0

Process

(b) Interpretive Matrix

Actor		P1 (Internal)	P2 (External)	P3 (External)	P4 (External)
Internal	A1	Vision/ Global Strategy	Provision of Resources for M&A	–	–
Internal	A2	Domestic Strategy	Post M&A Integration	Areas for Backward Integration	Understanding Customers Needs for Developing Solutions
Internal	A3	–	–	–	Developing Technological Solution
External	A4	–	Regulation for M&A	–	–

Process

Exhibit 3: Interpretive Logic – Knowledge Base - Ranking of Actors w.r.t. Processes

Paired Comparison	Interaction with Process	Interpretive Logic
A1 Dominating A2	P1	Vision/Global Strategy have more influence than domestic strategy on Technology and Business Strategy Alignment
	P2	Provision of resources for M&A is more important than Post M&A integration
A1 Dominating A3	P1	A3 is not having any direct role
	P2	A3 is not having any direct role
A1 Dominating A4	P1	A4 is not having any direct role
A2 Dominating A1	P3	A1 is not having any direct role
	P4	A1 is not having any direct role
A2 Dominating A3	P1	A3 is not having any direct role
	P2	A3 is not having any direct role
	P3	A3 is not having any direct role
	P4	Understanding Customer needs for developing solutions is more important than simply developing technological solutions
A2 Dominating A4	P1	A4 is not having any direct role
	P3	A4 is not having any direct role
	P4	A4 is not having any direct role
A3 Dominating A1/A4	P4	A1/A4 not having any direct role
A4 Dominating A1	P2	Regulation for M&A influence the M&A Process more than provisions of resources
A4 Dominating A2	P2	Regulation for M&A influence the M&A process more than post merger integration
A4 Dominating A3	P2	A3 is not having any direct role

Exhibit 4: Dominating Interactions Matrix – Ranking of Actors w.r.t. Processes

Dominating →

Being dominated ↓	A1	A2	A3	A4
A1	—	P1, P2	P1, P2	P1
A2	P3, P4	—	P1, P2, P3, P4	P1, P3, P4
A3	P4	—	—	P4
A4	P2	P2	P2	—

Exhibit 5: Dominance Matrix – Ranking of Actors w.r.t. Processes

	A1	A2	A3	A4	No. Dominating (D)	Net Dominance – (D-B)	Rank Dominating
A1	–	2	2	1	5	1	II
A2	2	–	4	3	9	6	I
A3	1	0	–	1	2	-5	IV
A4	1	1	1	–	3	-2	III
No.being Dominated (B)	4	3	7	5	19 (Total Interactions)		

Exhibit 6: Interpretive Ranking Model for Actors w.r.t. Roles in Processes

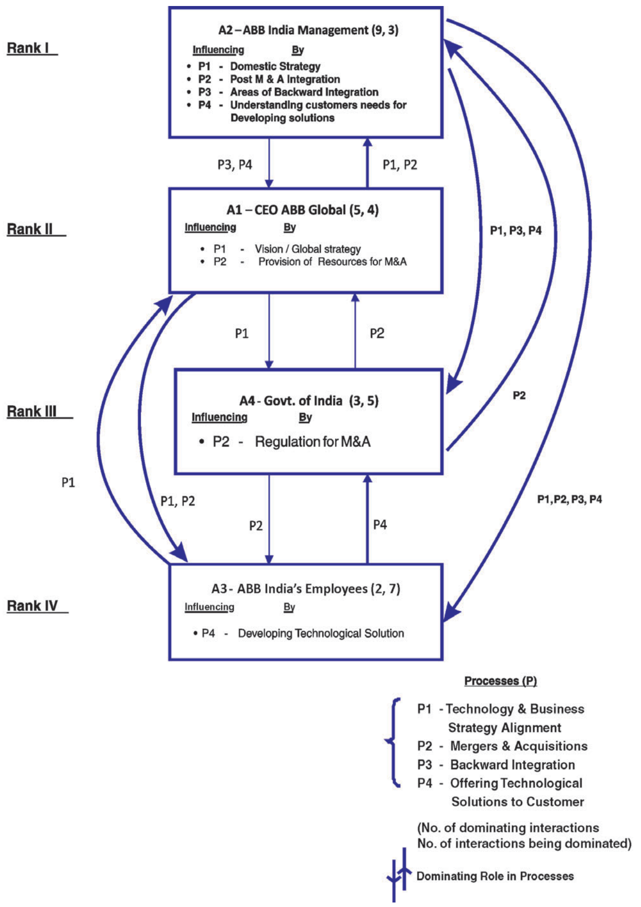


Exhibit 7: Cross-interaction Matrix 'Action x Performance' (ABB India)

Contextual Relationship: *Influence of actions on various performance areas*

(a) Binary Matrix

Action	P1*	P2*	P3*
A1*	1	0	1
A2*	1	1	1
A3*	0	1	0
A4*	1	0	1

Performance

(b) ***Interpretive Matrix***

Action	P1*	P2*	P3*
A1*	Better Techno-logical Solutions	–	Help in in-house Technology Development
A2*	Better Solutions and Value Offering	More Value to Customers	Higher Technology Capabilities
A3*	–	Reduced Cost	–
A4*	Better Technological Solution	–	In-house Technology Development

Performance

Exhibit 8: Interpretive Logic – Knowledge Base – Ranking of Actions w.r.t. Performance

Paired Comparison	Interaction with Performance Area	Interpretive Logic
A1* Dominating A3*	P1*	A3* is not having any direct influence
	P3*	A3* is not having any direct influence
A2* Dominating A1*	P1*	Customer value is contributing more to sustainable competitive advantage rather than technology excellence
	P2*	A1* not having any direct influence
	P3*	Higher Technology capabilities will lead to more technology development thereby reducing dependence on imported technology
A2* Dominating A3*	P1*	A3* is not having any direct influence
	P2*	More value to customers generates higher customer satisfaction than reduced cost
	P3*	A3* is not having any direct influence
A2* Dominating A4*	P1*	Better solutions and value offering contribute more to sustainable competitive advantage then only proving better technological solution
	P2*	A4* is not having any direct influence
	P3*	Creating Higher technology capabilities is a prerequisite in house technology development to reduce dependents on imported technology
A3* Dominating A1*/A4*	P2*	A1*/A4* not having any direct influence
A4* Dominating A3*	P1*	A3* is not having any direct influence
	P3*	A3* is not having any direct influence

Exhibit 9: Dominating Interactions Matrix – Ranking of Actions w.r.t. Performance

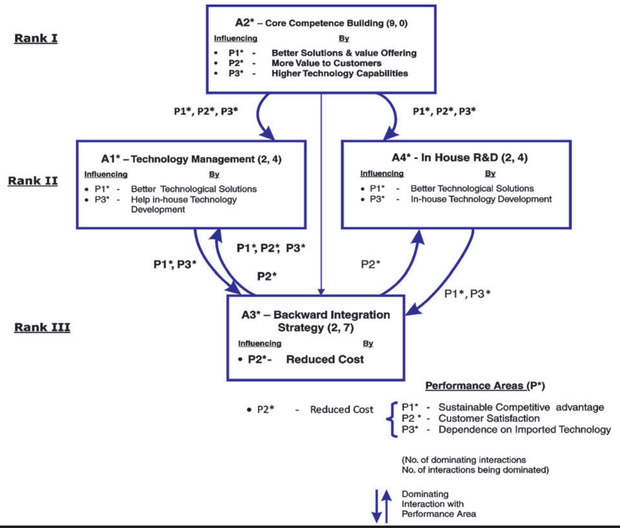
Dominating →

Being dominated ↓	A1*	A2*	A3*	A4*
A1*	—	—	P1*, P3*	—
A2*	P1*,P2*,P3*	—	P1*,P2*,P3*	P1*,P2*,P3*
A3*	P2*	—	—	P2*
A4*	—	—	P1*, P3*	—

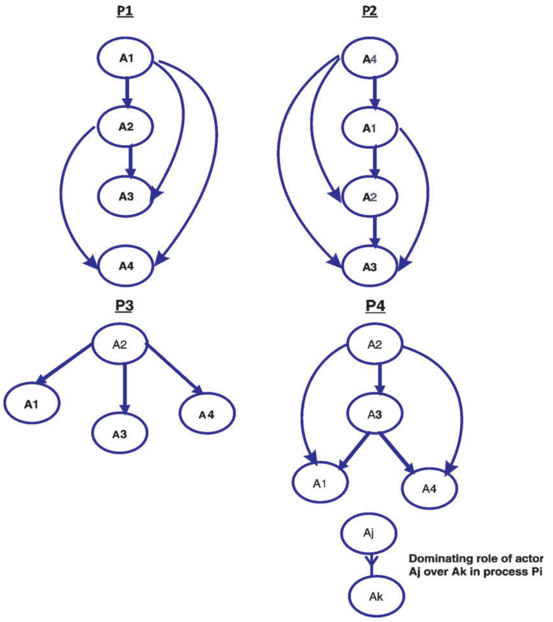
Exhibit 10: Dominance Matrix – Ranking of Actions w.r.t. Performance

	A1*	A2*	A3*	A4*	No. Dominating (D)	Net Dominance (D-B)	Rank Dominating
A1*	–	0	2	0	2	-2	II
A2*	3	–	3	3	9	9	I
A3*	1	0	–	1	2	-5	III
A4*	0	0	2	–	2	-2	II
No. being Dominated (B)	4	0	7	4	15 (Total Interactions)		

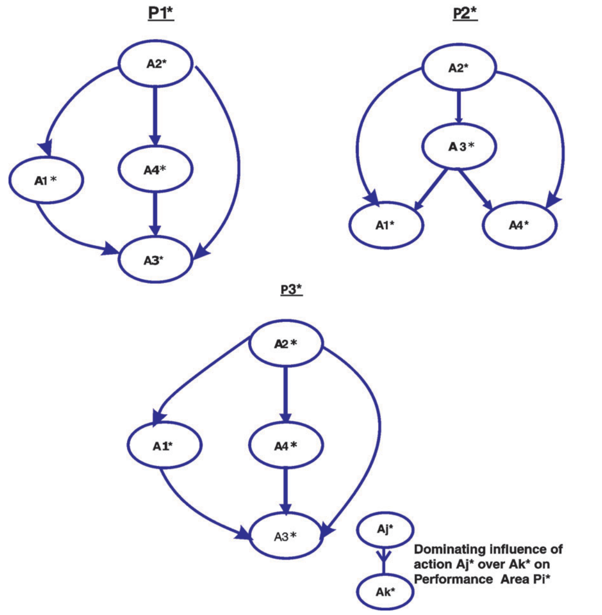
Exhibit 11: Interpretive Ranking Model for Actions w.r.t. Impact on Performance



Appendix II
Internal Validity of Pair-wise Comparison of Actors (Aj – Ak) through Dominance System Graphs for Various Processes (Pi)



Appendix III
Internal Validity of Pair-wise Comparison of Actions (Aj* - Ak*) through Dominance System Graphs for Various Performance Areas (Pi*)



Research Questions

1. Which decision-making areas, according to you, are most relevant for the application of the 'Interpretive Ranking Process' proposed in this paper?
2. Can you formulate a decision-making problem in your context that will require scaling-up the process proposed in this paper?

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