Decision Making – a Practitioner's Perspective

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Decisions, decisions decisions …

We keep making decisions, keep postponing decisions, sometimes jump to decisions and sometimes sit on decisions, sometimes are faced with tough decisions and sometimes we delegate decisions.

But decisions are part of life, more so, if you are designated as Manager – your job description may include quality of decision making as one of the key result areas.

In this paper, I present you some aspects of decision-making. Some of the materials I present would be very brief – you need to study further to master that subject.

First let me attempt to define decision-making –

Decision-making is choosing between alternatives while having incomplete / unreliable information about the scenario at hand and with uncertain and unpredictable outcomes of the available alternatives, mainly for the sake of expediency.

I said **incomplete and unreliable information** – because if you have complete and reliable information, you can make judgments.

Similarly, I said **uncertain and unpredictable outcomes** – again if you know the outcome and its certainty, they would have been called judgments.

I also said **expediency** – not justice. Decisions are made in organizations to tide over the present situation / difficulty. Therefore, sometimes decisions may render injustice. I do not condone this but merely state the facts of decision making.

One misunderstanding that is prevalent is that, the decisions are judgments – it is far from true.

Now we can move forward.

We can classify decision in to the following classes for our better understanding.

Classification of Decisions

1. **Strategic & Periodic Decisions**
    a. **Selection Decisions**
        i. Products / Services
        ii. Process
        iii. Locations
        iv. Layout
        v. Equipment
        vi. Workforce
    b. **Design Decisions**
        i. Product design
        ii. Service Design
        iii. Job Design
        iv. Process Design
        v. Control System Design
        vi. Capacity Design
2. **Recurring Decisions**

    a. Target Setting
    b. Scheduling
    c. Sequencing
    d. Inventory Control
    e. Cost Control
    f. Maintenance

3. **Planning Decisions**
   a. Planning the system
   b. Planning the usage of the system
4. **Organizing Decisions**
   a. Organization Structure
   b. Organizing the jobs
   c. Staffing
   d. Work and Workstation Design
   e. Standards of Performance
   f. Compensation Systems
5. **Controlling Decisions**
   a. Quality
   b. Quantity
   c. Schedule
   d. Inventories
   e. Costs
   f. Maintenance

It is not necessary that all decision makers make all the above-mentioned decisions. All of us make some of those decisions. It is perhaps, very few people – especially entrepreneurs – make all the above-mentioned decisions.

Decision Making Styles

Decision-making styles differ from person to person. It would help us to know the decision-making styles so that we can understand our own style. It is also obvious that the same style of decision-making is not appropriate for every scenario. Even though individuals may have their own style of decision-making, the knowledge of decision-making styles allows the flexibility to suppress our style and adopt the appropriate style that fits the scenario at hand. Now we can look at the styles of decision-making.

1. **Judgment** / **Hunch Based Decision Making** – this style is utilized by experienced persons. Experience builds knowledge and possible consequences that result from a decision. Some of us also are inherently "convergent thinkers" – that is we look for one best solution for a situation. Such "convergent thinkers" also use this type of decision-making. This style is best suited in situations when the experience/knowledge gap is wide between the decision-maker and the decision-implementers. Some scenarios that come to mind are –
   a. The decision implementers are trainees / novices and the decision maker is more experienced / knowledgeable
   b. Army and battle like or fire-fighting scenario – that is emergency scenarios
   c. Breakdown Maintenance
2. **Analytical Decision Making** – this style implies that a thorough analysis is carried out in which all possible alternatives are considered along with their costs and possible results are analyzed and the optimal decision is selected. This is used by knowledgeable people and somewhat less experienced in their field. The scenarios that come to mind where this style is appropriate are –

a. Strategic decisions which have long term impact – especially selection and design decisions
   b. There is time available for making the decision
3. **Precedence-based Decision Making** – many a time we use established practices and policies for making decisions. A well-repeated precedence is also called "Organizational Policy". This style is used to bring in uniformity between different decision makers – perhaps at different locations too – in decision-making. The scenarios that come to mind are –
   a. Senior Management sets the policy and middle managers make decisions
   b. Headquarters sets the policy and branches make decisions.
4. **Participative Decision Making** – this is also sometimes called as Consultative Decision-making. The decision maker consults the stakeholders to get their perspective to ensure that all concerns are taken into consideration before making the decision so that those concerns can be addressed in the decision. Possible scenarios are –
   a. Target setting
   b. Sequencing
   c. Scheduling
   d. Inventory control
   e. Preventive Maintenance
5. **Democratic Decision Making** – in this style of decision-making, the decision maker simply let the decision implementers make the decision. This is especially useful in public-interfacing scenarios. Decision maker formulates guidelines (or sets boundaries) and allow the decision implementer make the decision. Especially in knowledge realms like Research and Development, educational institutions, high-tech field, aid distribution work, field commanders in a battle this style of decision making is appropriate. Some of the possible decisions are –
6. **Consensus Building** – here the decision maker brings around acceptability for a decision from persons with different and sometimes conflicting interests in the matter at hand. The decision maker consults all the involved persons and finds out their concerns, and acceptability levels for the proposed decision, then negotiates with them to arrive at the consensus and then rolls out the decisions. This is normally followed in committees where peers come together to discuss and finalize a decision that concerns all of them in some way or the other. The trick is in arriving at a win-win situation for all. Everybody has to give something and take something. This needs a decision maker that is acceptable to all and is thoroughly knowledgeable in the field and decision scenario.

Dominant Factor

Some times there is a dominant factor that influences the decision-making. For example – for a mining company there is no alternative but to open it near the mine. A maritime ship liner needs to be near the seacoast. Location of market is another dominant factor. Other cases may include emotional factors of the entrepreneur – like his native place when it comes to opening his company or the expertise of the entrepreneur when it comes to selecting the product and so on. In day-to-day affairs, customer preference becomes a dominant factor, around which we have to manage. In some cases like Y2K, the time becomes the dominant factor. In some cases, the statutory obligations become the dominant factor. When a dominant factor is present in a decision scenario – the decision is made for us.

In other cases we can use some of the tools / techniques described below.

Available Tools and Techniques for Decision Making

The following are some of the tools and techniques developed over a period of time for improving the quality of decision making and reducing the dependency on the individual capacity to arrive at a good hunch-based decision.

Critical Examination

This is an excellent technique for bringing more clarity on the scenario and evaluating the available alternatives. Of course, we can use this tool in combination with other tools. It is based on tow sets of questions called –
1. Primary Questions – What and Why – clarity on the scenario
2. Secondary Questions – What Else and What Should – alternatives and selection

These questions are asked on five aspects of the scenario, namely,

1. Purpose (Why)
2. Means (How)
3. Place (Location)
4. Sequence (When)
5. Person (Who)

Question	What	Why	What else	What Should
Purpose	What is done? Is it necessary?	Why is it done?	What else could be done?	What should be done?
Means	How is it done?	Why this way?	How else?	How should?
Place	Where done?	Why there?	Where else?	Where should?
Sequence	When done?	Why then?	When else?	When should?
Person	Who does it?	Why them?	Who else?	Who should?

The entry in column captioned "What Should" gives the decision.

Critical examination can be utilized in any decision-making scenario. We can use other tools for evaluating alternatives (Column captioned "What Else") and to arrive at the possible decision.

Queuing Theory

Queuing Theory facilitates analysis of the workload at a workstation so that we can plan the number of workstations to optimize capacity utilization and service levels. Checkout counters, ticket issuing counters, mechanics are some of the more visible places where application of queuing theory can be seen. Queuing Theory allows us to visualize the work arrival rates, and execution rates at a given workstation and provides us with a set of equations for making decisions – especially with regard to building capacity.

Linear Programming

Linear Programming is a mathematical optimization technique that allows us to define objectives and constraints and it gives a procedure to optimize the objective. Optimization includes either maximization (such as revenue or profit) or minimization (such as cost, tardiness). The solution is derived by a procedure called "Simplex Programming". This is not practical to be used by manual means and computer assistance is more or less necessary to utilize this technique.

Transportation Problem

This deals with reaching a number of places (m) starting from a number of places (n) – while optimizing the travel. Typically this was originally applied for distribution from a number of warehouses across the country (or for that matter world, now) to a number of sales points across the country (or the world). This is solved using a number of iterations – each iteration, making an assignment of originations and destinations and computing the costs thereto. The assignment is iterated until a satisfactory solution is found. For real-life problems, assistance of a computer is necessary to be able to use this technique.

PERT/CPM

PERT (Program Evaluation and Review Technique) originated in research and development field as a tool for visualizing the activities to be performed for completing the program as well as for handling the uncertainty involved in research and development domain using probability theory. Critical path Method originated in construction industry for determining the completion time for projects and identifying the critical activities, which should not be delayed if the project is to be completed on schedule. Both are network-based techniques and over a period of time came to be referred and used together. These techniques help us in visualizing the activities and their sequence of performance to complete a project, deal with uncertainties as well as identify the critical activities in the project. We need to take computer assistance for utilizing this technique too.
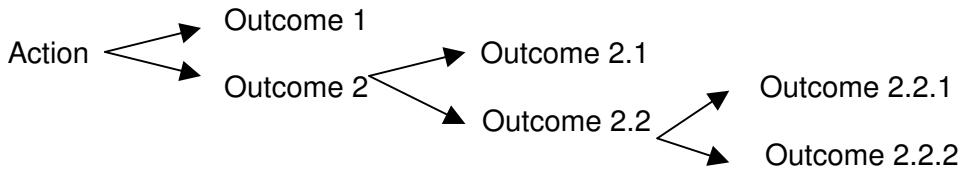
Management Games or Game Theory

This helps in analyzing competition strategy. It helps us in finding the outcome of strategies of two parties. It is expressed popularly in prisoner's dilemma problem. Two people are caught at the scene of a theft and interrogated in two separate rooms. Now if neither confesses, they may go Scot-free or suffer the minimum sentence. If either one or both of them confess and implicate the other they certainly suffer the maximum sentence. Neither knows the strategy of the other. More often than not, managers find themselves in a similar situation – perhaps instead of sentence, it could be profit or gain / lose a deal. Game Theory helps us in working out possible outcomes for a number of strategies / counter-strategies and select the optimal strategy.

Delphi Method

Delphi method consists of consulting a number of experts on the subject matter requiring a decision. It is iterated till the majority of experts converge on to a single set of actions.

Decision Trees

Decision Trees allow us to graphically explore the possibilities for the consequences of our actions.

Action → Outcome 1
Action → Outcome 2 → Outcome 2.1
Outcome 2 → Outcome 2.2 → Outcome 2.2.1
Outcome 2.2 → Outcome 2.2.2

An example of a Decision tree is shown above. The branches can be any number and grow in any direction.

Interpolation & Extrapolation

These are also referred to as Time Series Analysis. Both are statistical techniques for forecasting future trend using historical data. Interpolation is for forecasting an intermediate value and Extrapolation is for forecasting a future value.

Sampling

The assumption is that a randomly drawn sample truly represents the homogenous universe from which it is drawn is the basis for using sampling plans. This is used to test assumptions, theories, proposed decisions and quality control. The key terms used in the context of sampling are –

1. Universe or population – the whole gamut of data - all are relevant candidates covered. This is very large – so large that it is not practical to cover every member of the population
2. Sample – a small section of the population or universe
3. Candidate – each data item in the population or universe considered for inclusion in the sample

 The key aspects for sampling to be successful are (i) the population or universe is homogenous and (ii) the sample is randomly drawn. On many occasions, we find that the population is not truly and fully homogenous. Therefore, we use many techniques for drawing samples. Some of these are –

1. **Random Sampling** – used in truly homogenous population. We draw sample candidates based on a lottery or using random numbers.
2. **Judgment Sampling** – we select the sample based on our judgment about the candidate's ability to truly represent the population
3. **Convenient Sampling** – we select the candidates who are available to us without much exertion
4. **Stratified Sampling** – this is more authentic manner of sampling and is used in populations that are not truly and fully homogenous. We divide the population into various strata and draw random sample from each strata
5. **Cluster Sampling** – we divide the population into representative clusters and draw sample candidates from each of the clusters using random sampling technique

We use Single Sampling Plan or double Sampling Plan in the context of Sampling.

Single Sampling Plan suggests that we draw one sample from the population and use it to make assumptions about the population.

In **Double Sampling Plans**, we have two methods.

We draw one sample, test it and then draw another sample if the results of first sample are somehow not found satisfactory, from the same population and test it. Based on the outcomes of the two samples, decisions are made. This is popular in lot testing. When there are large number of products to be tested, a sample is drawn and tested. A second sample is drawn if the first sample fails the criteria for lot acceptance. If the second sample confirms the findings of the first sample, then the lot is rejected. But if the first sample failed the lot and the second sample passed the lot, the organizational process is followed. It can be accept the lot or carry out 100% testing or take another sample and take the majority outcome.

We draw two samples from the same population and test them with two independent agencies and compare the results. One popular example that comes to mind is testing for cancer thru biopsy – two samples are sent to two laboratories and compare the findings.

Statistical Analysis

I would recommend a basic course in statistics for every manager who would like to make good decisions. I would go so far as to say that every manager uses statistics, albeit, to the extent of using averages. But statistics is a very powerful tool for effective decision-making. The following few statistical techniques that I think are most valuable for decision-makers. The below description is not comprehensive and I advocate that you educate yourself in these techniques by studying more elaborate material on these topics.

> **Measures of Central Tendency, Dispersion, & Skewness** - these values help us in drawing inferences about the population. We have three measures of central tendency of data, namely Mean, Mode and Median. Arithmetic Mean (normally called the average value) is used to summarize data for us. We use terms such as mean time between failures, average defect density and average duration of a project etc for describing population attributes. Mean is a good measure when we have large number of data but it may not be appropriate for small number of data. For small number of data, Statistical Mode (Model Value or Most Occurring Value) is more suitable. The other measure of central tendency is Median or the middle value. The measures of dispersion describe the variability of data. Most commonly used measures of dispersion are Standard Deviation (σ - Sigma) and Variance. Other measures of dispersion are quartile deviation, percentile deviation etc. Skewness is a measure that tells whether the data is normally distributed or is skewed in someway. We have to check this as we cannot take normal decisions from a data that is skewed one way or the other.
> **Correlation** – or **Covariance** is the method to determine if one set of out comes is related to one set of inputs. A common question – such as, would increased inspection ensure higher quality? – can be examined by this measure. We compute Coefficient of Co-variation based on which we draw an inference whether one is dependent on the other.
> **Probability Distributions** – we have three popular probability distributions, namely Normal, Binomial and Poisson Probability Distributions. Normal Probability Distribution assists us in inferencing about normally occurring values. Binomial Probability Distribution assists us inferencing about values, which are binary in nature – that is only two possible values – like tossing of a coin. Poisson Probability Distribution assists us in inferencing about rare events – like fires, floods, and earthquakes etc. There are other probability distributions such as Beta Distribution, Gamma Distribution, and T Distribution etc.
> **Tests of Goodness of Fit** – we use this to validate the results obtained from our testing. We compute measure of goodness of fit χ^2 (pronounced Chi Square - Ch as in K) from the expected values and the actual values.

> ➤ **Hypothesis Testing** – this assists us in designing of tests and use of Sampling of data and assists us in determining if our hypothesis is valid or not.

Consultants

More often than not, managers have to manage a knowledge area, in which they do not have much knowledge about. Also true is the fact, that they do not have experience in the decision-scenario to be able to define and assess the alternatives, assess the possible outcomes and the knowledge, many times, to properly define the problem too. That is where consultants come in handy. They bring in their knowledge, assist us in all areas from problem definition, development of decision-scenario, enumerate the alternatives and possible outcomes and enable us to select the optimal decision.

Decision Postmortem

We should learn from the outcomes of all the decisions we made. The decision outcomes could be –

1. As we expected – wonderful – we need to examine whether we made a good decision or control of decision implementation ensured the expected result
2. Better than expected – we need to analyze what caused the improvement so that we can use that aspect in all our future decisions
3. Worse than expected – we need to analyze what caused the decision to fail and how it could have been prevented. In all our future decisions, we need to avoid these pitfalls.

Should we make a formal postmortem with all concerned and document it?

Documenting is always good as it is available for future reference – even if it is only for us.

Involving others is optional. We may involve or may not, we may just get the facts / data, we must however, analyze the decision.

Conclusion

We make decisions and therefore, we need to be aware of decision making theory and master as many tools and techniques as possible.

We have to note that decision is choosing between available alternatives and is not the same as justice. Decision is for expediency.

We must carry out a postmortem of our decisions to learn lessons so that our decision quality can be improved.

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