

Organization of Engineering Systems and Human Resources Management
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Module - 2
Effectiveness and Performance
Lecture - 24
Longitudinal Thinking

We now move on to the study of a dimension in organization and human resources management, which is poised to become increasingly relevant and useful in understanding of organizational dynamics, and that is perhaps best expressed as longitudinal thinking. So far management theory has been resplendent, with what has been called lateral thinking. Lateral thinking is a useful perspective, because it highlights, the ability to draw analogies, by sourcing experience in a manner, which makes it possible to find solutions, elsewhere on similar situations, and applied to the situation at hand, by an application of those principles in a modified form, or being processed for its innovative situation. Be that as it may, the focus has over years, certainly show in the last decade or so, moved on to yet another perspective on organization and human resources management, which can be called longitudinal thinking.

The concept of longitudinal thinking is not taken up for the first time, because there has been a tradition of research in longitudinal thinking, which has established traditions, in terms of cohort analysis, in terms of longitudinal analysis. And what is now gradually emerging is, highlighting its significance for understanding behavioral patterns, for understanding organizational patterns, and imparting to the study of organization theory and practice a dimension, which recognizes the reality of the heritage variable. Recognizes that nothing begins from a zero situation of experience, but there is always a baggage, and when you enter the scene, you have to begin work, in an environment where the baggage is a reality. Now, the ability to decompose that baggage into its constituent elements, and then classify it into its plus aspect, and the minus aspects.

The positive aspects and the detrimental aspects, may be the key for effective managerial action, because your first attempt would have to be purge the negative components of the heritage variable. And your second effort would be, to work in the present and plan for the future, recognizing the reality of the given situation, and rooting future action, on the

existing bed of patterns of work. In other words, rooting the intervention into existing patterns of thought analysis and decision making, and then gradually trying to shift it and moderate it. What has happened is, over a period of time, longitudinal perspectives have gained in popularity, so much, so that typically when the golden jubilee volume of IIT Delhi was designed.

It was as an act of conscious choice; captioned as IIT Delhi, a longitudinal perspective. In other words, to do an analysis of how institution grew, what are their factors which went into its making, what are the challenges it faced and a facing, where is its position and, so the longitudinal perspective was the operational aspect given, to looking at the evolutionary components, the historical dimension of institution building. Similarly, if you want to understand the intellectual trends in history of ideas, a good way would be, to practice some longitudinal thinking, and do an anthology of selections of writings year wise, over a period of say 20 years, 30 years, or what have you.

And if you see the treatment of the subject, as say it was in 1890 with 1990, then you get a century's evolution and growth patterns. You can reduce the time frame, as have seen earlier onto 20 or 30 years. And if you do an analysis of way as subject matter was treated; say in 1984, and the way that subject matter was treated in 2013, then you get a longitudinal perspective over 30 years, and the examples can be multiplied.

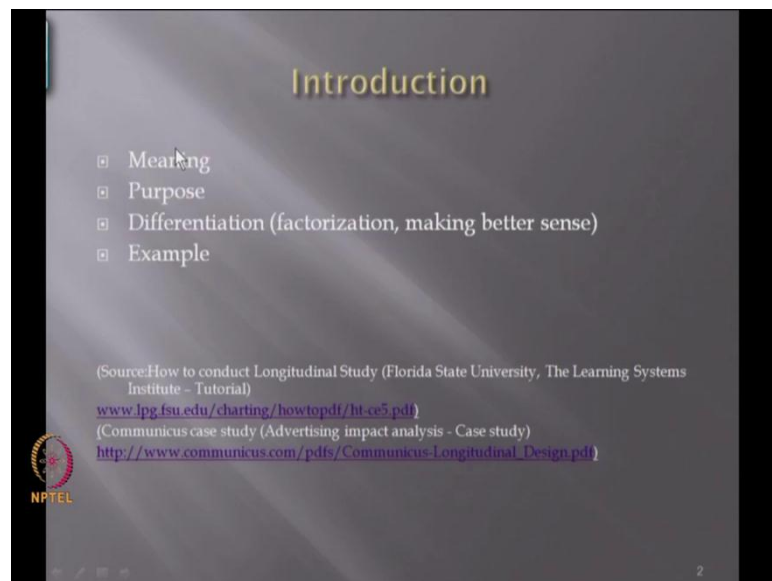
One way of doing it would be, to do a selection year wise, or volume wise of journals which have survived over these years, and see what the crusts and the tufts' and the evolutionary patterns of thought are over a time frame, and that is again longitudinally thinking or longitudinally speaking. And this has been done to various journals with tremendous inputs, to what can be called as historio graphical studies of ideas.

Surely something which is worthwhile to understand where we are today in a given domain. Indeed how did we get there, what are the strengths of thoughts at different phases, of the literature which was produced, and what messages can it give for the future directions. To put is simply therefore, like the advantages of lateral thinking. There are advantages of longitudinal thinking, and significant research has been done, on applications of longitudinal thinking perspectives.

Say on the growth of organization structures over decades, to see what was the critical points of intervention, critical points of change, and with what results. Such studies exist in

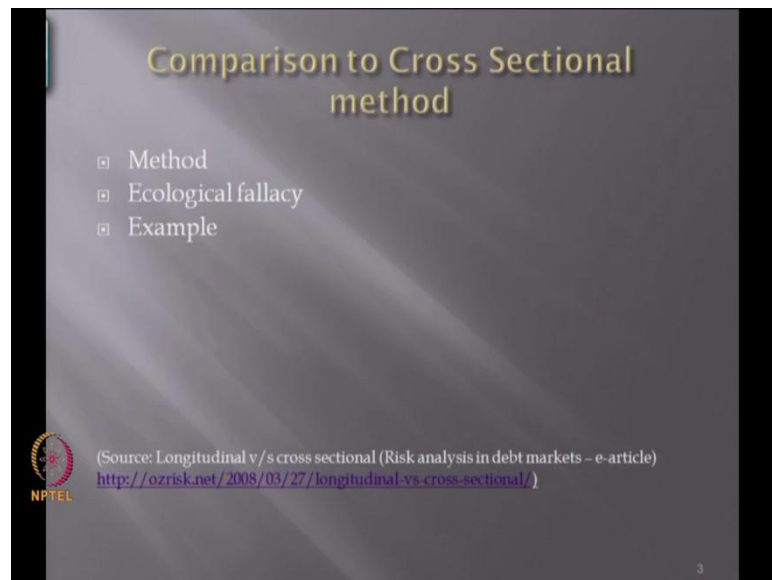
pharmaceutical sector and other examples are available. The papers of this narration, is to establish with you, the intellectual credibility, desirability, and indeed the applicability of longitudinal thinking to current managerial analysis. And I intend take you through dually annotated thoughts of some of the thinkers in this area, so that you are able to see for yourself, the applications of longitudinal thinking, and enrich your managerial rapatua in looking at organizations, looking at human resources dimension, and using what is a very important method of analysis, for better and more effective decision making.

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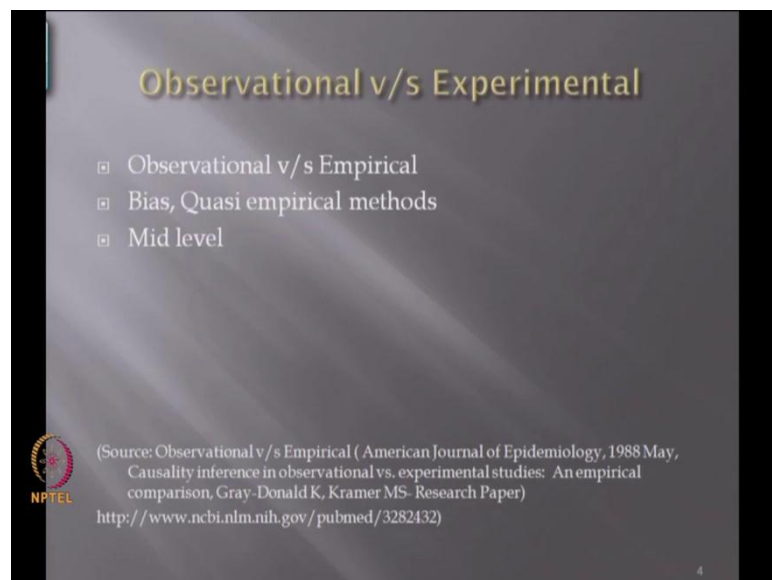
We would want to look at the purpose, which will follow analysis of the meaning. The differentiation in longitudinal thinking of factorization making better sense, and then we will have an example. This has set sources which are listed here. For those of you who are more ambitious, but that is not an essential of your part of learning, in terms of what is going to be narrated.

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Now, longitudinal thinking has often been compared to cross sectional method, which requires us to look at methods; the ecological fallacy, and the illustrations of the same.

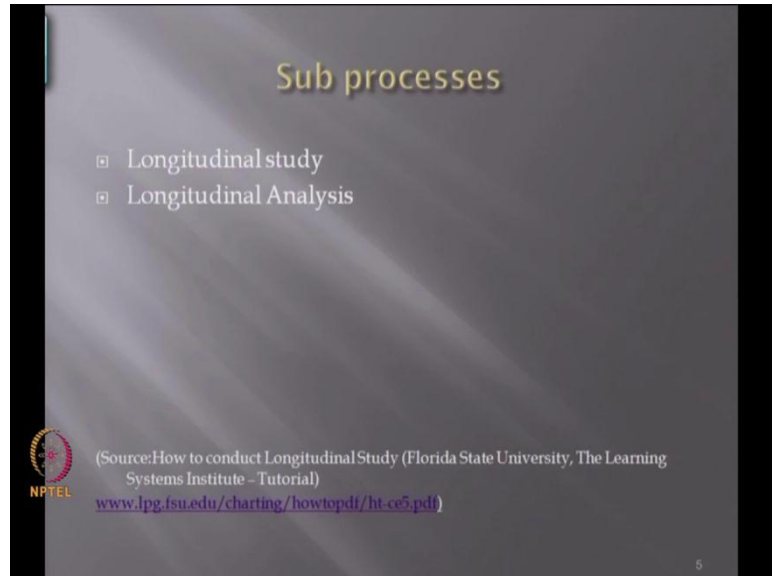
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Longitudinal thinking can have observation as a method, empiricism as a method. So, that one is able to identify biases, and quasi empirical methods, to we put to use for correction of these biases, and the focus for entry into an organization can be at a middle level. The American journal of epidemiology, has spent some time looking at these issues. And especially the mail version of the year 1988, has a paper captioned causality influence in

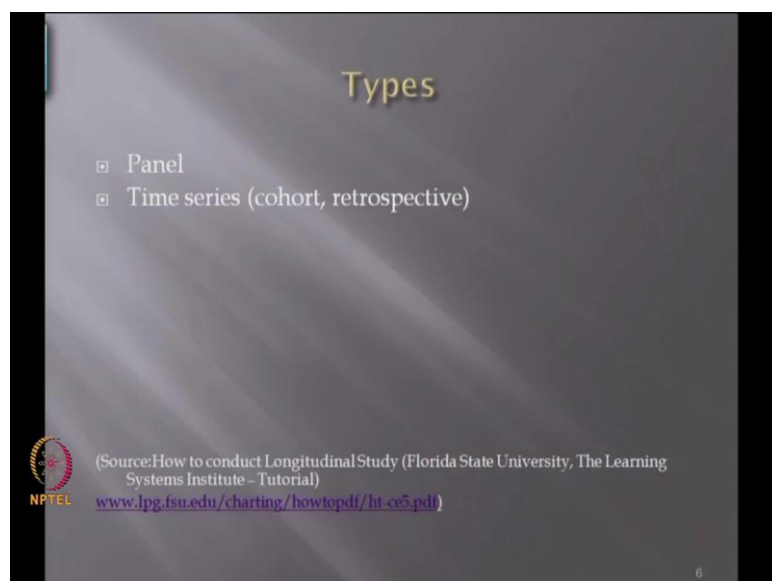
observational versus experimental studies and empirical comparison, by great Donald. K. Crema, and this is the source of the observations this slide makes.

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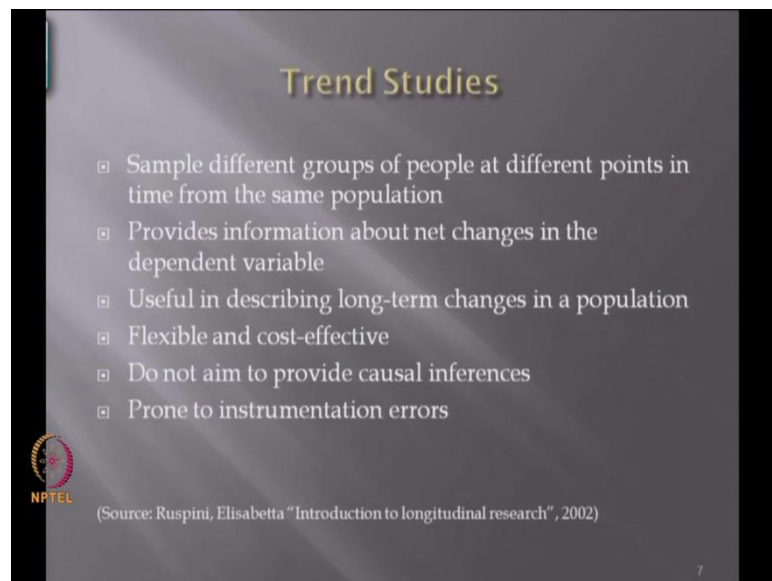
So, your attention is therefore drawn, to the need to understand longitudinal thinking as a sub process, and then the need to follow it up with longitudinal analysis. I may point out that longitudinal study, and longitudinal analysis are two different things. Both of which are extremely relevant for the purposes, which we have at hand here.

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There are types of longitudinal thinking; there is the panel type, and there is the time series type. In the time series type there is the cohort study, and there is the retrospective study. I would briefly refer to these, because they are by way of traditions of longitudinal analysis, and may or may not have universal reference, relevance to managerial analysis, but there is nothing has universal reference to any other dimension of analysis. Relevance and reference has always to be selective from issue to issue, and has to go hand and hand with other tools and techniques, which are required for a scientific conclusion.

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Trend Studies

- ❑ Sample different groups of people at different points in time from the same population
- ❑ Provides information about net changes in the dependent variable
- ❑ Useful in describing long-term changes in a population
- ❑ Flexible and cost-effective
- ❑ Do not aim to provide causal inferences
- ❑ Prone to instrumentation errors

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(Source: Ruspini, Elisabetta "Introduction to longitudinal research", 2002)

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Longitudinal studies require trend studies, how do you study trends. Trends are over a period of time which is what makes it longitudinal. There are samples are drawn from different groups of people, at different points of time from the same population. And if you draw samples, from different groups of people, at different points of time from the same population, then you have got to the bottom of a longitudinal analysis.

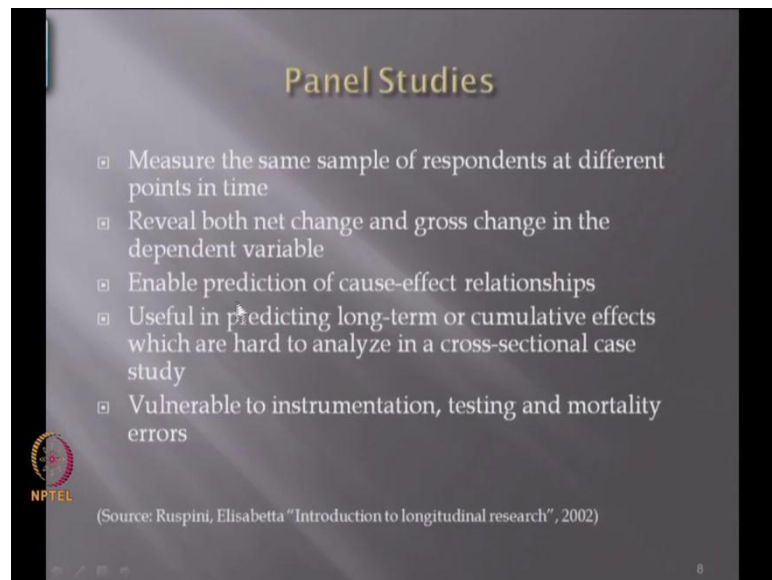
The use of this is obvious, it get into trends which will have, or relevance to policy formulation, relevance to managerial action, and relevance to the functioning of systems which make them proactive, and which make them operationally relevant. Providing information about net changes in the dependant variable will help to manage development in a way, in which developmental exercise draws advantage from the management method, and different variables are manipulated in a very positive sense, to create the desired

policy frame work for desired results. And this requires providing information about the net changes which has to be brought about in the dependant variable.

Other illustration therefore, I would like to point out, that this kind of analysis will be useful in describing long term changes in a population, and prepare for it, and plan the resources for it. These are flexible and cost effective methods. They do not aim to provide a casual inference, now this is very important. No virtuosity is attempted to be attached to the system, so that you recognize, that it is impossible to be judgmental in empirical situations, but empirical situations speak on their characters, and take on their impact, from what can be at best termed as the facts of the case. Then the consequences, then determine how it would work. One will have to recognize, if this analysis is relevant to a given managerial problem, which one is trying to grapple with.

And also recheck once instruments, because there can be scientific instruments, and remember our elaboration in the preceding presentation on man machine interaction, so to ensure that there are no instrumentation errors. The purpose of highlighting here is very simply, to draw your attention to a very simple perspective. The simple perspective is, please recognize that longitudinal analysis is a felid scientific method of establishing trends, and establishing the implications of those tends for managerial action, and where you apply it in operational terms, is a matter of choice, and in a matter of relevance. Here again the reference is given from Ruspini Elisabettas work on introduction to longitudinal research of the year 2002. In other words, this kind of trend studies have been established at a methodological level for nearly a decade now, and there research applications are becoming more and more common.

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Panel Studies

- ❑ Measure the same sample of respondents at different points in time
- ❑ Reveal both net change and gross change in the dependent variable
- ❑ Enable prediction of cause-effect relationships
- ❑ Useful in predicting long-term or cumulative effects which are hard to analyze in a cross-sectional case study
- ❑ Vulnerable to instrumentation, testing and mortality errors

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(Source: Ruspini, Elisabetta "Introduction to longitudinal research", 2002)

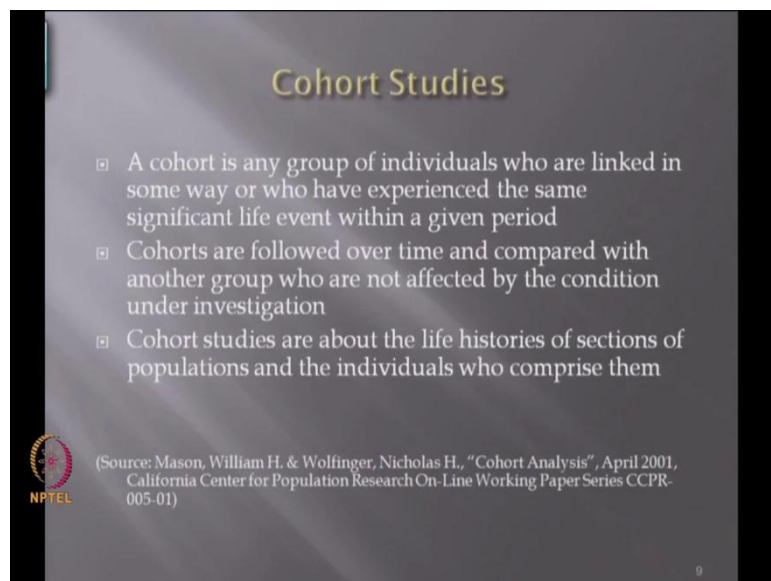
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Then there are panel study, as just as trend studies can be applied to organizations, panel studies can also be applied to organizations. It measures the same sample of respondents at different points of time. And here again, the emphasis is on the time dimension which is what all the historical method is all about. You look at change in time sequence and you write the history. You plan change in time sequence, and you plan managerial action. If you measure the same sample of respondents at different points of time, you have got to the bottom of the panel studies. This would reveal both the net change and the gross change in the dependant variable. If you look at the net change, and the gross change in dependant variable, when you are getting under the skin of both; a managerial analysis, and the application of a managerial analysis to developmental processes, which may be the root to proper policy planning.

So, there is a possibility of applying, management principles both to developmental processes, and policy planning, not just for the sake of better cooperate functioning, but better resource management. The net result is to enable a prediction of cause effect relationships, and that is the heart of scientific action. If you can enable a prediction of cause effect relationships, you are on the road to somewhere, and that is the advantage of longitudinal thinking. It has its uses in predicting long term or cumulative effects, which are hard to analyze in a cross sectional case study.

Therefore, what you do, you can integrate the method, of a cross sectional analysis, with the panel approach, and with what was just described earlier on as trend studies. So, cross section with trend, with panel studies and you have got a rich rapatua, which will enrich managerial analysis, and make decision making that much more simpler and scientific, which brings us to an illustration of, the whole pattern which has been labeled as cohort studies.

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Cohort Studies

- ❑ A cohort is any group of individuals who are linked in some way or who have experienced the same significant life event within a given period
- ❑ Cohorts are followed over time and compared with another group who are not affected by the condition under investigation
- ❑ Cohort studies are about the life histories of sections of populations and the individuals who comprise them

NPTEL (Source: Mason, William H. & Wolfinger, Nicholas H., "Cohort Analysis", April 2001, California Center for Population Research On-Line Working Paper Series CCPR-005-01)

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Cohort analysis has been around for nearly a decade now, and some of the researchers in the field; such as William H Mason, Nicholas Wolfinger have been attains to emphasis, that a cohort is any group of individuals, who are linked in some way, or who have experienced the same significant life event, within a given period. We look like we have something here, which has been missing in managerial analysis till date, and if the future of management is to be enriched further for decision making processes, will have to look at the situation.

Let us go through this again, a cohort is any group of individuals, who are linked in some way. It may be a migrant population, it may be the expatriate situation, it may have ethnic under pinning's, it may have experiences of same natural phenomenon like earth quake, or volcanic eruption, it may be the response to tsunamic experiences, whatever. A cohort is any group of individuals who are linked in some way, and some way has content which

has just been elaborated, or who have experienced the same significant life event, within a given period.

And if you do an analysis therefore, of this process, the coping mechanism becomes easier, and it is simpler to design strategies, which would meet the situation. These cohorts are followed over time and compared with another group, who are not affected by the condition under investigation. Again to repeat for the sake of clarity the statement, cohorts are followed over time, and it just had the definition of cohort here, and they are compared with another group who are not affected by the condition under investigation.

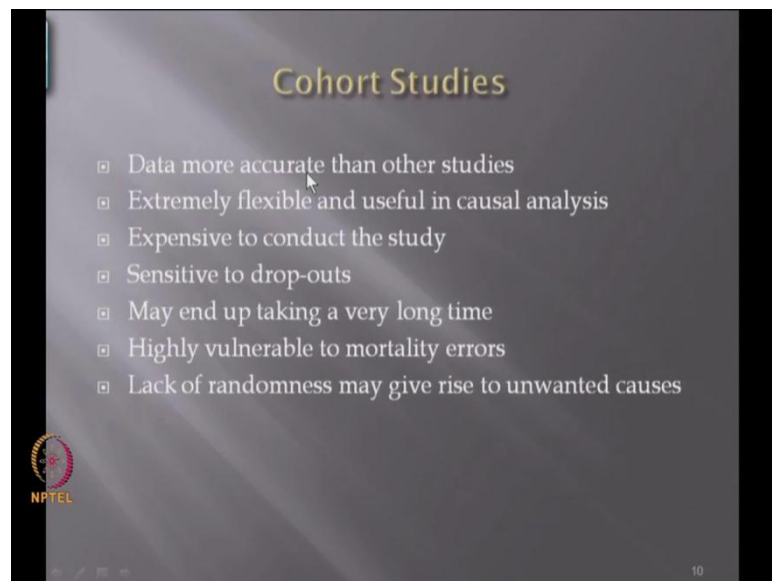
So, the impact of the condition, is therefore better understood, and when the condition re occurs, the coping mechanisms are more in position. This can apply to floods, this can apply to earth quakes. You could do a longitudinal study of the famine of the thirties of the last century, and compare it to a famine which has occurred more recently. You could look at the example of what happened with the co sea floods, four decades ago, and compare it to the floods which happened in Uttarakand not so long ago. Add to it the unique features of the (()) and develop a blue print of disaster management and disaster mitigation.

Drawing upon the strengths of longitudinal studies, and design a policy there in, which helps to operate a decision framework; this can be applied to an organizational frame also, when you look at mergers and de mergers, when you look at acquisitions and restructuring, what are the kings of managerial issues which emerge, how would you develop a strategy on responding to it, and to cut a long story short. The perspective which is being submitted for your consideration is, a simple a line of thought which urges you to consider, application of the principles of longitudinal studies, to decision making and action in the corporate world, in the functioning of societal experience, as well as in the open systems. Whatever it may be, the applications of management principles are universal, and they take on sectoral overtones, depending upon the characteristics of the sector.

Cohort studies are about the life histories of sections of population, and the individuals who comprise them, when we are talking of social engineering, when we are talking of the upliftment of the disadvantage groups, when we are looking at providing equity as a destination, for all results of social engineering. It is obvious that cohort studies on life histories, of sections of population, and individuals that comprise them, would be essential

to look at developmental managerial interventions. The perspective is simple. The perspective is, to explain the phenomenon, to understand the phenomenon, and by explaining the phenomenon, to understand the phenomenon. You enter a situation, where you find that the decision making tools can be considerably enriched, by adding to the rapatua, which already exists. The tools of longitudinal thinking and longitudinal analysis, I will display to you very quickly a couple of slides which have to do with cohort studies, and move on to their managerial applications.

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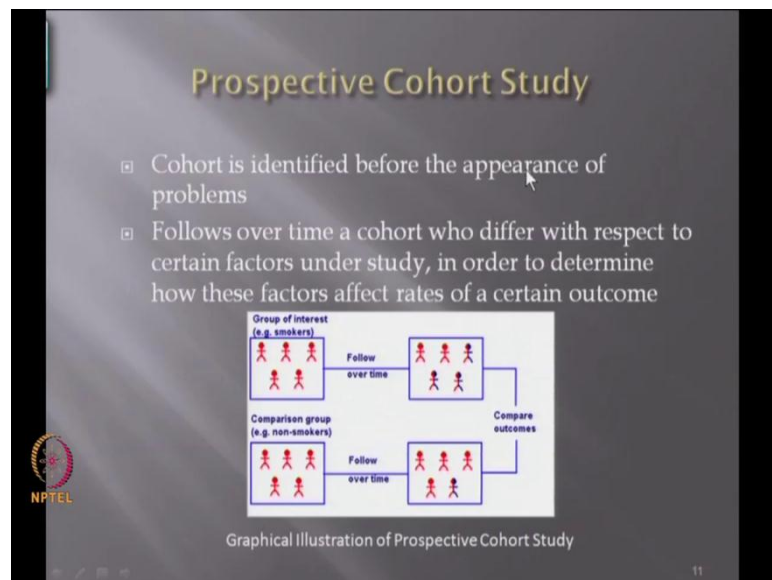
Cohort studies require data, which is more accurate than other studies, because it is extremely annotative. It is a cohort studies are extremely flexible and useful in causal analysis, and the cause effect factor has already been explained. Cohort studies are expensive, because they require extensive documentation, and at times instruments of analysis which need to be preserved with care. Cohort studies may end up by taking a very long time, because the time constant is the critical differentiating variable in longitudinal analysis. There was a study of individual lives, captioned achieving lives, which compared the life experiences of the same group of people, 15 years apart and to distal the findings there from.

And you can imagine the richness of insights, which then emerged, on how those individuals are going to are going to handle their life issues. And if, you apply the same principle to organizational analysis, the richness of the perspectives, which will grow to be

available, to people who have to take decisions on organizations, which are both old, but capable of being young. Organizations which have survived the rest of time by continuous self renewal, but in (()) the future, they do not have the necessary documentation, to analyze and derive implications for that, which is why one refer to data which was more accurate than other studies in cohort studies, but then this kind of analysis can be highly vulnerable to mortality errors, and this has to be factored in.

The other danger is, lack of randomness, because of its very scientific bases, may give rise to unwanted causes, which may not be real causes in operation life, what would be the result of statistical analysis which would then throughout. But these are research issues, which I am flagging here to create a scientific and a conscious awareness of longitudinal thinking, without necessarily walking you through, or the research considerations, because at the level at which this course is switched, it attempts to brief you all the fundamentals of organization, management, and human resources considerations for a person who is relatively senior in the study of the undergraduate course work, but is capable of growing into a more deeper appreciation, of both the engineering method and the management method.

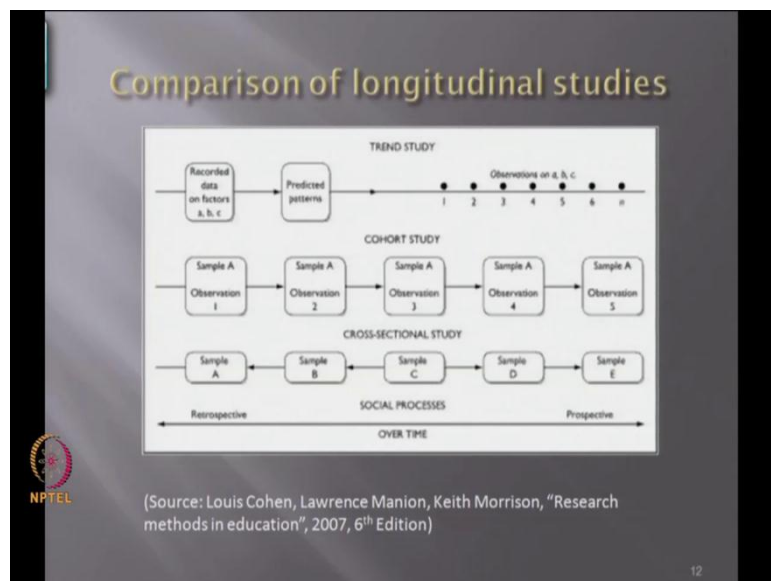
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The explanation therefore, is about the appearance of the problem, in other words the presence of the problem; and following it over time, a cohort who differs, with respect to certain factors under study, in order to determine, how these factors affect the rates of

certain outcomes. Looks at a group of interests, of say smokers, and a group of interest of non smokers over a period of time, and you compare the outcomes. A very incidental example of the method, which can be extended into deeper issues and wider issues, to see what happens when certain elements were present in one sequence of experience, but not present in another sequence of experience, and then what were the outcomes, and then compare the two get at hand a course of action, which has managerial significance.

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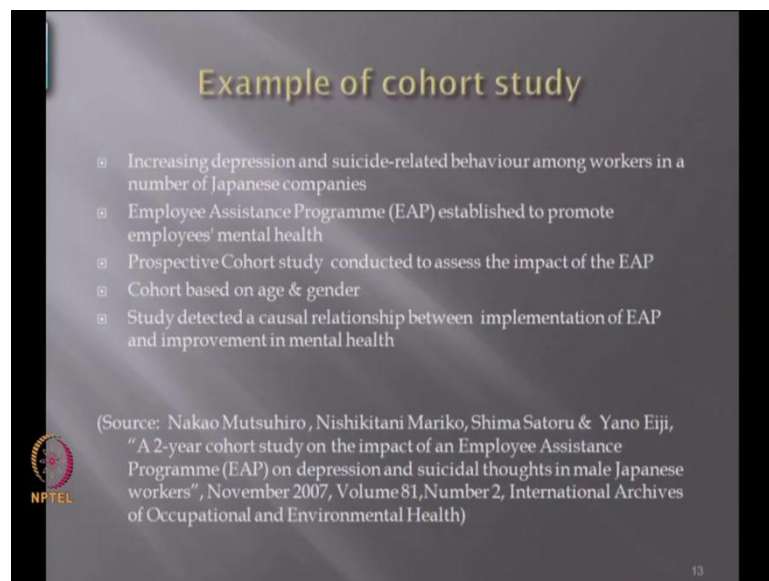


This is an example of the trend study; it speaks for itself over a time series analysis, where you move on from a recorded data on factors a b c, over predicted patterns observations of a b c, at different points of time. This is the trend analysis. The cohort analysis requires the same sample at different points of observation; observation one, observation two, observation three, observation four, observation five. A cross sectional study which again looks at the same sample a b c d e, where sample c is the base one trend goes to sample b and sample a, another trend goes to sample d and sample e. And what you have at hand is social processes overtime, and you can have a retrospective, and you can have a prospective.

In other words, for methods of application all of them from longitudinal studies, talking of trend studies, cohort studies, cross sectional studies, and social processes. This is something which is rooted in the thinking of Louis Cohen and Lawrence Manion, Keith Morrison in the sixth edition of their book, research methods in education of 2007, and to

be it appears establishes the scientific bases of. Some of the methods adopted in longitudinal analysis, which can be used in decision making and problem solving, certainly in the corporate world, and there are serious possibilities of their application outside the corporate world, in decision making, which has to do with developmental analysis, or decision making which has to do with leading to policy choices, or indeed application of longitudinal thinking under open systems.

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The slide features a dark grey background with a light blue and yellow gradient at the top. The title 'Example of cohort study' is centered in a yellow font. Below the title is a list of five bullet points, each preceded by a small square icon. At the bottom left is the NPTEL logo, and at the bottom right is the number '13'. The source text is located at the bottom center of the slide.

Example of cohort study

- ❑ Increasing depression and suicide-related behaviour among workers in a number of Japanese companies
- ❑ Employee Assistance Programme (EAP) established to promote employees' mental health
- ❑ Prospective Cohort study conducted to assess the impact of the EAP
- ❑ Cohort based on age & gender
- ❑ Study detected a causal relationship between implementation of EAP and improvement in mental health

(Source: Nakao Mitsuhiro, Nishikitani Mariko, Shima Satoru & Yano Eiji, "A 2-year cohort study on the impact of an Employee Assistance Programme (EAP) on depression and suicidal thoughts in male Japanese workers", November 2007, Volume 81, Number 2, International Archives of Occupational and Environmental Health)


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Examples of cohort studies are several, let me show to you some. Increasing depression and suicide related behavior amongst workers in a number of Japanese companies. Employee assistance programs established to promote employees mental health. Prospective cohort study, conducted to assess the impact of the employee assistance program, cohort based on age and gender. Studies have detected a causal relationship between implementation of e a p, and improvement in mental health. The source of this conclusion is given here, and you are welcome to follow it, if you are ambitious in following up the empirical dimension of managerial conclusions. I leave the source here, so that you may wish to take it down, if it is of any interest to you.

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LONGITUDINAL THINKING AND ORGANIZATIONAL EFFECTIVENESS

- **Organizational Learning Vs Individual Learning**
 - There is a debate among the scholars about whether or not organizations can learn and many just take the approach that organizational learning is the sum total of the individual learning occurring in the workplace (Argyris & Schon, 1996; Levitt & March, 1988; Normann, 1985; Weick & Westley, 1996).
- **Now the focus shifted to Group Learning**
 - As a result of this there is a new view of organization with necessary shifts in attitudes, beliefs and practices.
- **Learning is something that happens all the time (David Cowan, 1995)**
- **Organizational learning should be Circular, Longitudinal and Integrative rather than Linear, Cross-Sectional and Compartmental**
 - "Rhythms of Learning: Patterns that bridge Individuals and Organizations" by David Cowan (1995).

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It would be relatively simple to move on from here, to longitudinal thinking and organizational effectiveness. Argyris and Schon just as much as Levitt and March, or Normann, or Weick and Westley over a period of time ranging from 1985 to 1996, generated a debate on organizational learning versus individual learning, and the debate was, whether or not organizations can learn, or many just take the approach that organizational learning is the sum total of the individual learning, occurring in a work place. The debate still is unresolved, whether there is such a thing as the learn ability of organizations per say, or organizational learning is essentially the sum total of individual occurring in the workplace. I am not going to get into the points and the counter points of the debate, but this is an illustration of how longitudinal thinking has been linked up with organizational effectiveness. It is also recognized that it has left an impact on group learning.

As a result of this there are new ideas of organizations with necessary shifts in attitudes, belief and practices, and if organizations deal with attitudes believes and practices, longitudinal thinking is again of help. Learning something that happens all the time said David Cowan, or as was pointed out again by him in his writing on rhythms of learning, patterns that bridge individuals and organizations. He maintained that organizational learning should be circular, longitudinal and integrative, rather than linear, cross sectional, and compartmental. So, he was really talking of integrated learning. He was trying to get into the issues of structure of learning, and if you got into the issues of

structure of learning. You realized that conscious learning cannot be encouraged, unless you have a scientific bases for the structure of learning.

So, what longitudinal thinking has done is, it has strengthen the studies on structure of knowledge, with structure of learning, and the two combined together, are poised to cause a major revolution in organizational theory and practice, and as many listeners to this presentation are really preparing for a currier for the days to come. One has to pass on and share with them certain perspectives, which are sprouting in the current environment, but how a serious possibility of becoming more significant in years to come. And therefore, there should be trade to orient themselves in learnings, which will emerge, demands which will be made on their skills rather than teaching them today, only what has been practiced in the past; and therefore not really making a very serious contribution, towards their preparation for the future.

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The slide, titled "Organizational Learning Model: Medicine Wheel", features a list of bullet points and a compass rose diagram. The bullet points are: "By - David Cowan in 1995.", "Symbolized by a circle showing the four directions on a compass", "Direction of movement: Clockwise", and "Learning beginning in the East". Below these, four directions are listed with their corresponding concepts: East (Anticipation, Direction, Vision, Expanded Perspective), South (Curiosity, Innocence), West (Conviction, Self-assurance), and North (Integration, Wisdom, Sharing of Ideas and Views). A compass rose diagram is positioned to the right of the text, showing the four cardinal directions (N, S, E, W) with a central point. The NPTEL logo is visible in the bottom left corner, and the number 15 is in the bottom right corner.

- By - David Cowan in 1995.
- Symbolized by a circle showing the four directions on a compass
- Direction of movement: Clockwise
- Learning beginning in the East
 - East → Anticipation, Direction, Vision, Expanded Perspective
 - South → Curiosity, Innocence
 - West → Conviction, Self-assurance
 - North → Integration, Wisdom, Sharing of Ideas and Views

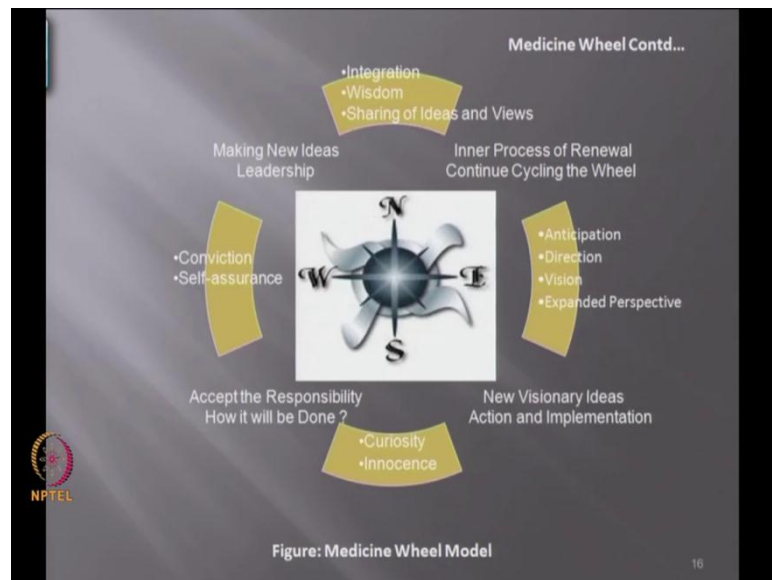
Organizational learning has drawn from various areas, and this is a Brrowing which has it has made from the medicine wheel. This was established again by David Cowan, it is symbolized by circle showing four direction on a compass. The direction of movement clockwise; remember he was earlier on talking of circular longitudinal integrative learning. So, to illustrate his circular learning, he drew upon the concept of a compass, which was linked up with a medicine wheel, and where medicine comes in will be cleared in a subsequent diagram. And east south west north were symbolic of certain messages, where

it was maintained that learning begins in the east. East stood for anticipation, direction, vision expanded perspective, and that is where learning begins. Learning begins with anticipation, direction, vision, expanded perspective.

And east was chosen, because sun rises in the east, and the east was chosen, because symbolically it marks a beginning, east was chosen, because that is what it is in the popular for the clock. If you go from the east in a clock ward manner you reach south, and you have curiosity and innocence. So, anticipation a sense of direction and vision and expansion, would need to be followed up by curiosity and innocence. Innocence here means willingness to absorb from a zero point, and not get into a combat mode which anything which does not confirm to your own experience. You proceed further from the south, to the west in a clock wards manner, and from curiosity arises conviction and self assurance.

Now from anticipation you have reached a level of self assurance, but when you reach the level of assurance, your journey continues in a clock ward manner, and you reach north, and while reaching north you have reached a level of integrating knowledge, reaching wisdom and sharing of ideas and views. And that circle again begins of anticipation direction vision. In other words after reaching north here, you go back to the east you reach the south, you reach the west, and which is what Cowan calls circular learning. And he sees this as an essential part of longitudinal thinking, when you draw upon your experience of the past, to prepare yourself better for the future, and so the cycle goes on. I will pause here for a few moments, for you to absorb what is being stated.

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This diagram would then evolve, into what could be called the medicine wheel model. Now I would wish you, to absorb this in a significant manner, not all at one go. You take a quick look at it, or I will be getting back to it in the next presentation, so that we develop from there into applications of longitudinal thinking.