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Application of Interactive Planning Methodology to Multi-Project Environment

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***Abstract*— Short time-to-market and low costs of projects require effective and efficient management of projects. As progress in projects is not always as what is foreseen and because new projects need to be started up all of a sudden during the year due to fast changing results managing multiple projects simultaneously is essential. Management of projects in multi-project environments is difficult and often faces lots of problems in organizations such as software, research and development, construction and engineering. This article especially fits in with research and development organizations where multiple projects are run concurrently, and resources are important and scarce. In this research, interactive planning methodology is suggested to overcome the problems in multi-project research and development environment.**

Keywords—Multi-project; Interactive Planning; Systems Approach; Research and Development.

I. INTRODUCTION

The common sight in the field of project management has concentrated on what could be named the single project environment. However, corporations do not run one project at one time or several projects that are independent of each other. Companies have to deal with an environment in which their projects sometimes contend with each other. There is a struggle and strive for scarce resources, thus management takes short-term decisions that are damaging from a corporate perspective.

A characteristic of multi-project organization is that a corporation may simultaneously run a series of projects that to a certain extent are interrelated and interdependent. The dependencies that connect different projects with each other may be technological, knowledge-oriented, product-oriented or interlinked by the deliveries made to the customer. On the other hand, there may be projects that are independent regarding the dimensions mentioned above, but which are interrelated by task dependencies or common resources. This creates a web-like multi-level structure that may be called a multi-project environment [1].

There are several papers in literature suggesting various methods in order to help managers analyze relations and dependencies between business decisions and engineering tasks on the strategic level in order to design a purposeful multiproject environment. These methods are the dependence structure matrix (DSM), resource allocation methods, domain mapping matrix (DMM) etc. Some papers propose an approach for evolving an integrated performance index (IPI) that could adequately reflect the performance of the research and development (R&D) project at any point during its life cycle, by integrating the key factors from each phase of the project life cycle [2],[3]. In some papers, based on empirical studies and on the literature analysis project portfolio management is suggested as solution to manage in multi-project environment. [4], [5].

In this paper, I will try to suggest a model to manage problems encountered in multi-project R&D environment by using interactive planning methodology.

Allocation of people resources in multi project R&D environment is one of the most frequently cited problems [6]. The ideas, talents and skills of scientists, engineers and other technical professionals are an R&D organizations greatest asset. In organizations whose most valued product is essentially ideas, the importance of effective utilization of human resources cannot be overemphasized, especially when multiple projects run concurrently. Interactive planning methodology is suggested to manage the resource allocation problems in R&D projects [7]. Interactive planning methodology is derived from the concept of interactivism. It is a participative method of dealing with a set of interrelated problems. Interactive planning has two parts: idealization and realization. These parts are divisible into five interrelated phases: Formulating the mess , ends planning, means planning, resource planning, design of implementation and controls [8]. These phases will be analyzed and applied to solve the resource problems in multi-project R&D environment in the following chapters.

II. LITERATURE REVIEW

A. Multi-Project Enviroment

The traditional approach to project management considers projects as being independent of each other. In a multi-project environment, projects compete for resources with each other, so the overall strategic effort of a corporation is directed at finding ways to deal with possible resources insufficiencies. Due to fact that some resources overloaded with work and others under-utilized, too many projects finish late, and projects only deliver part of what they should. Thus, quality suffers. Customer expectations are not met, and Management cannot find out exactly what is happening at any point in time and have little information on which to make decisions. Few people seem to know or understand how any project fits, let alone supports the organization's vision and strategy. There needs to be a balance between a project's demands on autonomy and the functional department's need for technology and knowledge development. It is sometimes difficult to reconcile short-term demands with long-term demands [1]. These resource problems occur in many organizations to a lesser or greater extent and these affect organizations in terms of customer satisfaction, employee morale, productivity, costs of quality and quantity of service provided.

Recently, the focus in researches has shifted towards the recognition of multi-project environment. Several authors have attempted to create an increased understanding of this situation and they tried following combined ways to attack problems in multi-project environment:

- Using one or more methodologies that identifies that each project runs in a multiproject environment and that adding business value is most important.
- Using simple queuing theory in order to optimize resource usage and maximize customer satisfaction.
- Having a good project management information system.
- Following knowledge management practices and good resources.

B. Interactive Planning Methodology

Interactive planning was developed by Russell Ackoff [to assist stakeholders design a desirable future for themselves, their organization and environment it inhabits [9]. Interactive planning methodology is derived from the concept of interactivism, which is a participative method of dealing with a set of interrelated problems when it is believed that unless something is done, a desirable future is not likely to occur; and that if appropriate action is taken, the likelihood of such a future can be increased [9].This methodology acknowledges the interdependence of the problems constituting a system. It proceeds from a treatment of the whole to the interaction of the parts and then finally to the parts themselves.

In literature, interactive planning methodology is suggested to be used for variety of situations, including product development, strategic planning and facilities design. The methodology has been successfully applied across different industries by many organizations and enterprises [10]. Interactive planning methodology can also be considered as an alternative solution method to overcome problems encountered in multi-project environment because it is a comprehensive enough methodology to solve potential problems in such environment.

Interactive planning has two parts: idealization and realization. These parts are divisible into five interrelated phases [8] , [11] :

1. Formulating the mess
2. Ends planning
3. Means planning
4. Resource planning
5. Design of implementation and control

Executing these phases, the advantages of using interactive planning can be said to be many to overcome resource problems in multi-project environment. These are:

- The approach facilitates the participation of all members of an organization in the planning process and this endorses a bottom-up approach as opposed to the typical top-down approach to decision making. In multi-project environment, there is very few people seem to know or understand how any project fits, let alone supports the organization's vision and strategy. Letting the front-line employees participate in the decision-making process is advantageous for their in-depth knowledge and expertise at the operational level. Therefore it secures the main benefit of planning.

- Innovation carries a lot of weight at any levels of projects but in multi-project environment, innovation is occasionally mentioned but never seems to happen. Interactive planning acknowledges creativity and appreciates out-of-the-box thinking. Participants are encouraged to be as creative as possible in coming up with the idealized design. Idealized design releases large amounts of suppressed creativity and harnesses it to organizational development.

- Interactive planning expands participants' conception of what is possible and reveals that the biggest obstructions to achieving the future most desired are often self-imposed constraints.

- The participative principle helps generate consensus and commitment, and eases the implementation of the outcomes of planning in multiproject environment.

- Interactive planning facilitates ease of implementation. Important aspects of the interactive planning methodology are transparency and awareness of the project. Lacking of quality and transparency in project information is important issue faced in multi-project environment thus interactive planning plays an important role in here. Being transparent addresses and manages the employees' feelings of apprehension and fear of the unknown. This lessens the resistance and facilitates buy-in. Moreover, since the people who made the plan are also the ones responsible for its

implementation, they already know what to do and how to go about it from the start.

- The methodology enables involving all concerned parties in the decision-making process, which ensures that all parties are heard and all issues are covered. This leads to better and more informed decision making in multi-project environment.

- It gives all planners an opportunity to create their own future. They do not plan for the future using forecasts that are oftentimes unrealistic and inaccurate, but by using assumptions and possible scenarios about the future. Using current assumptions builds enough flexibility and responsiveness into the design of the system, which enables it to withstand change rapidly. This gives the organization further control over future.

III. CASE STUDY

In this section, a case study will be presented introducing the application of interactive planning method on a multi-project R&D environment. Three characteristics for R & D organizations are as follows:

- The uncertainty of project results and project timing. The unique characteristics of each project is based on a high degree of innovation
- Human knowledge is the scarcest resource in R&D projects. Everyone provides his specific contribution to every project.
- Project progress depends on the building blocks that are invented by the engineers. Human ingenuity is dependent on the motivation and involvement of each engineer.

Due to these characteristics, the process of resource allocation is difficult and complex in R&D environments. The allocation method needs to be flexible to adapt to the fast changing project environment. Since each specialist has specific knowledge allocating him to a project may be difficult, especially if he is lacking certain other characteristics of that project.

Interactive planning methodology is applied to multi-project environments using the five interrelated phases of mess formulation, ends planning, means planning, resource planning, and finally implementation and control.

A. Mess Formulation

It starts with a systems analysis and obstruction analysis followed by the development of reference projections and reference scenarios. In R&D environment systems analysis should cover the current status of the R&D organizations businesses and overview of the businesses that they want to be in. At this stage it is important that the business goals and objectives are understood to avoid different sections of the organization working at cross-purpose with each other. The obstruction analysis should focus on the conflicts that surface between the business and the function and the function and business. In addition, conflicts within the functions should be identified. Once these two analysis are completed, it can be determined whether the organization should prepare a idealized redesign of its functions in order to meet the projects goals and objectives.

B. End Planning

In this stage, groups can be formed that are going to lead the creation of a consumer idealized design development. For this purpose, two groups (consumer and designer group) can be formed.

The consumer group should consist of individuals that are the recipient of the service R&D organization is going to provide. These participants were chosen based on 6 criteria:

1. They work on projects in R&D environment
2. They are responsible for the projects success
3. They are capable of specifying what they need from a project implementation
4. They present diversity in thought and in gender
5. They are capable of thinking ‘outside of box’
6. They understand the need for a R&D project and its role in business.

The consumer group participants should include manufacturing operators, mechanics, plant managers, product managers, business managers, and functional managers.

The consumer group planning session should began with a background information on overall interactive planning process and why they are bought together to help in developing an idealized project system. The participants should identify the positive and negative output issues of the current system. The next step should involve specifying the priorities for an ideal project environment. The output issues can be identified and categorized using three multiple levels of explanations: systematic structure, patterns and behavior, and events.

The participants in the designer group should consist of R&D professionals, along with functional managers, business and functional directors, manufacturing and business managers, and marketing managers. They should be selected based on 4 criteria;

- They had detailed R&D project knowledge
- They are capable of thinking outside of the box
- They had positive attitude
- They represent diversity in though and gender.

With the consumer group’s output issues and specifications in hand, the designer group should be tasked with developing and ideal R&D project environment that would replace the previous system. The redesigned system should use all of the specifications and dissolve all of the output issues identified by the consumer group. The session should begin with background information on overall interactive planning process and the iterative design process they would use to develop the idealized system. In addition, a brief review of the current economic state of the R&D businesses should be presented. It

is also important that the participants begin their work by understanding each others perspectives. Therefore, to begin the process the designers should identify system's stakeholders, those that could affect or be affected by the new system.

The designer group participants should begin the iterative design process by following these four steps. Firstly they should create a purposeful mission statement. Then the new system functions should be identified, the output issues and stakeholder expectations should be referred to as the basis for identifying the system functions to meet the business goals and objectives. Once the functions are identified, the new system processes that would get the work done should receive attention.

Once the work processes are developed, it should be determined whether the work processes are broad enough to be applied across the R&D environment or not. The final step in the iterative design process should involve creating an organizational project structure that would be capable of delivering the functions to the business. This step should focus on the flow of responsibility and authority within the R&D organization, the relationship between units, the flow of internal communications, how resources will be distributed.

C. Means Planning

Once the idealized system redesign is completed, a team should be organized to close gaps between the current state and the idealized redesign state. The team should consist of R&D professionals within the organization. The key steps in means planning are:

- Providing a thorough appreciation of the mission statement, functions, processes, and structure of the idealized system redesign, along with expectations and specifications of the consumer group.
- Ensuring that the team understood the business needs and why it was necessary to implement the idealized redesign
- Obtaining agreement from the team members on their roles and responsibilities for undertaking the change effort
- Confining the overall effort to a manageable business unit
- Incorporating the redesign efforts goals and objectives into annual business goals

D. Resource Planning

Once the mean planning was developed, the resource plan should be prepared by the team. The resources that need attention are personnel, money, facilities, equipment, and materials, supplies and services.

Personnel planning- a full time project manager and new facilitator might be necessary to undertake the tactical work of implementation and address strategic issues of implementation.

Financial Planning- During the entire interactive planning process, team should be dedicated to reduce costs to meet profit objectives. Hence, a detailed cost accounting is necessary.

Facilities and Equipment Planning – this part should focus primarily on the acquisition and deployment of computer hardware to team leaders and their network members. This deployment can be used as a measure as to whether management was committed to the effort.

E. Design of Implementation and Control

This phase of the interactive planning process is all about who is going to do what, when, where and how. There are five key factors that significantly influenced the successful implementation of the idealized new system redesign:

1. Human factor is the most important success factor of the effort involved the people who worked on realizing the idealized system redesign.

2. Organizational factor – undertaking such a significant transformation requires full support from management at all levels. In order to gain this support, management should be engaged in participation.

3. Work factor- Changing the way people do business is not easy. Therefore, a great deal of transactional work must be done, which will add value to the work performed, making it more interesting, challenging, leading to opportunities for advancement.

4. Technology factor – Having an information technology platform in place that would allow for on-line collaboration and retention of the organizational memory is important.

5. Commitment factor – It must be noted that in any business there will be being difference between committed and employees and compliant employees. Committed employees bring energy, excitement to their work. A central theme of interactive planning is the principle of participation by all those who will be affected or can affect the planning process.

This final phase can be characterized by designing controls into the implementation process. Critical operating tasks that need to be accomplished within a given amount of time should be identified by the teams. These tasks can be categorized by determining who is doing what, where, how and then linked to specific product deliverables identified in the consumer idealized design. Progress on these tasks can be reviewed on a monthly basis and adjustments should be made where necessary. These adjustments could include schedule timing, financing, and resourcing.

IV. CONCLUSION

Multi-project environment is an environment in which a series of projects are run simultaneously that are interrelated and interdependent. The dependencies that connect different projects with each other may be technological, knowledge-oriented, product-oriented or interlinked. On the other hand, there may be projects that are independent regarding the dimensions mentioned above, but which share important

resources with other projects and are interrelated by task dependencies.

Problems in multi-project environments can be categorized into some relevant problem areas such as project level activities, portfolio level activities, management of project-oriented business, information management, commitment, roles and responsibilities, resources, competencies and methods. In literature, there are some methods suggested to overcome these problems like the Dependence Structure Matrix (DSM), resource allocation methods, Domain Mapping Matrix (DMM) etc.

Interactive planning methodology can be considered as an alternative management method in order to manage the problems encountered in multiproject environment because of its comprehensive methodology that is enough to be able to overcome problems in multi-project environment.

The approach facilitates the participation of all members of an organization in the planning process and participating promotes the development of the members of the organization. Also, it prevents from lacking of quality and transparency in project information, in this way the roles and responsibilities can be clear. Interactive planning acknowledges creativity and appreciates out-of-the-box thinking. Participants are encouraged to be as creative as possible in coming up with the idealized design and the problem of innovation in multi-project environment can be solved by this way. Improper implementation is the major problem in project level activities and interactive planning facilitates ease of implementation.

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BIOGRAPHY

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