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Analysis of Investments in IT Organizations

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The world today stands on the threshold of Information Technology (I.T) age. The birth of powerful I.T systems and their increased application in organizations have changed the way organizations are conceived and managed. Many organizations and corporates use I.T as a buzzword for organizational image building and in this process land up in 'I.T for the sake of I.T'. This paper analyses the investment in I.T from this standpoint to arrive at optimum ways to maximize the benefits.

Information Technology is a combination of software, hardware, communications, and services capped by a vision on how technology can help an organization reach its goals. Organizations have been predominantly human. But, I.T applications have taken up many jobs previously handled by humans and many jobs that are humanly impossible to do. I.T scientists and sociologists now consider an organization as a specific solution created by a collection of many agents or entities (human or non-human) each assigned one or more tasks or roles and having interrelations with others to achieve common goals. This agent based approach to organizations as a Multi-Agent System (MAS) is gaining currency of late. In a MAS environment, machines are often referred as *agents* and humans as *actors* to make them explicit. When agents and actors co-exist, the organization is called a hybrid organization. The deployment of I.T cannot be viewed in isolation; but along with human agents and their organizational roles in each of the tasks being computerized.

The questions

For each e-commerce or other IT investment, we begin with two deceptively simple questions:

1. Should we invest?
2. How to justify the ROI on the investment?

In a hybrid organization we reframe these questions as:

- What is the optimum combination of machines and humans?
- What are the areas in which I.T agents are most suitable to be deployed?

In deciding which areas are to be prioritized for I.T agents, the roles in an organization are to be classified into the following categories:

a) Roles that cannot be transferred to agents
b) Roles that can be transferred to agents
c) Humanly impossible roles that can be effectively done only by agents

Hybridization in organizations

An organization usually starts implementing I.T by computerizing areas at present handled by humans and move on to new areas. Part or whole of the roles of category (b) mentioned above, can be transferred to an agent depending on the priorities of the management and funds available for investment. The extent of roles that are transferred to an agent indicates the degree of hybridisation. It is also possible that an agent may take up the roles from more than one entity. The degree of hybridization is defined as ***d/k*** with respect to a task when ***d*** number of roles of the corresponding ***k*** actor roles are transferred to the agent (Ines Münch et al., 2000). For example, if an actor has 20 roles for a task in an organization of which 5 are transferred to an agent, the degree of hybridization is 0.25 with respect to that specific task. Due to diversity, size and the dynamic nature of organizations, it is practically difficult to list all the roles played by every entity in the organization and the above measure of hybridization becomes rather academic. Also, in practice, one cannot computerize task by task, since many tasks are inter-related. Hence an indirect and generalized measure is used in this study to estimate the degree of hybridization or hybridization index (T) as the number of humans required in place of the I.T agent.

For example, if a computer application can replace the work of 20 persons, the degree of hybridization will be 20. For virtual applications which can be done only by I.T agents, the measure will be taken by estimating the number of humans required to offer similar service.

The study

A study was conducted in three commercial organizations on the application of agents and the results showed that there are five major scenarios in I.T investments and corresponding benefits derived (see fig. 1). The graph in fig. 1 does not imply that the scenarios happen one after the other. The benefits as shown in the figure include saving in overheads, higher efficiency and productivity, and goodwill.

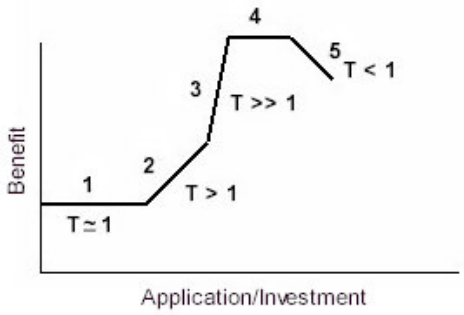

Fig 1 I.T application scenarios

Scenario 1: The I.T investments or applications make the operations more systematic, but do not result in any marked benefit for the organization.
Scenario 2: The investment or applications give proportionate benefits

Scenario 3: The benefits far outweigh the investments in I.T
Scenario 4: No additional benefits
Scenario 5: The benefits decline even with additional investments

Scenario analysis

In manual intensive tasks (scenario 1), investment in technology will not bring out considerable benefits, but will marginally improve efficiency. No human power can be replaced in this scenario and the hybridization index (T) is nearly unity. In scenario 2, mostly relating to operational functions, the benefits are proportionate to investment in I.T applications. The index (T) also increases proportionately. More than index, the impact is observed more in productivity, and goodwill resulting in more business volumes. Specialized areas like Internet and data mining corresponds to scenario 3, where the tasks are beyond human capability. The index (T) is dramatically high in these areas and the need for such applications is for business continuity and survival in the competitive market.

In scenario 4, we observe application enhancements, which do not result in real benefits. Some examples are sending multi-media SMS messages instead of plain text, using 64 bit computer applications when 32 bit applications are enough to meet the task requirements, and using cluster servers when the applications are not really online. In scenario 5, we find examples like ERP systems for routine discrete applications, and using multiple disaster recovery sites, which result in increased overheads, additional I.T manpower and often higher turn-around times.

The hybridization index for the scenarios is estimated as 3-10 for scenario 2 and more than 100 for scenario 3.

Application & Recommendations

The procedure outlined above enables to assess the return on investment in I.T by calculating the hybridization index for existing I.T applications in an organization or on future scenarios in taking an investment decision today. The analysis can be done for individual applications or on an aggregate basis for each function or division. The scenarios 1,4 and 5 are to be definitely avoided and between 2 and 3 a prudent decision is to be taken by the management based on investment opportunity and business plan.

An organization should start with and concentrate on investments in scenario 2, which result in increased benefits. The investment in scenario 3 is to be considered to tap new business opportunities and to stay in competition with the peers.

Conclusion

This paper reviewed the different scenarios in I.T investment in organizations from the hybridization perspective. The generalized

hybridization index suggested can be used to assess benefits of I.T deployment in different functional areas, and in taking investment decisions for the future.

References

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