

**Determinants of Certain Characteristics of Information Technology
Deployment in Organizations - A Theoretical Explanation**

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ABSTRACT

The last two decades of the twentieth century have seen a rapid evolution of information technology (IT) capabilities. At the same time, we observe that all organisations do not exploit the available IT capabilities in the same manner and to the same extent. Thus the characteristics of IT deployment like the scale, nature, and criticality of IT use etc., differ significantly across organisations. In the face of rapidly changing business environments and exponentially increasing capabilities of information technologies, it has become imperative for organisations to understand and appreciate the correct level of emphasis that they should place on IT. This issue is of critical importance in the present times, for the purpose of planning and managing the information systems (IS)/IT environment in an effective manner. Managers have therefore been concerned about identifying the scale and nature of IT deployment appropriate for their organisations, with the intention of enhancing the business effectiveness of their IT applications. However, such understanding on part of managers has at the best, remained at an intuitive level only. This is because so far the research has not reached the stage of a well-defined framework for understanding the basic causal factors which give rise to the different manifest characteristics of IT deployment in an organisation. This dissertation develops an explanation for the differences in the character of IT deployment in organisations.

Various authors have suggested that there are significant differences in the extent to which firms can exploit IT. They have also emphasised the importance of an orderly and consistent definition of the role that IT must play, in order to address changing business requirements and take advantage of technological developments. Further they have noted the inability of organisations to identify and articulate the impact that IT has, or should have, on their business.

The existing literature in this field addresses the following issues.

1. Frameworks for classifying organisations into different categories, based on certain external manifestations of the characteristics of IT use, like the strategic importance of IT applications, the role of IT in the business, the diffusion of IT in an organisation etc.
2. Certain fundamental factors affecting the characteristics of IT use in organisations. These factors related to characteristics of the external environment, the nature of the products,

services and customer requirements and some aspects of the internal processes within firms.

The classification frameworks describe external manifestations of IT use in organisations. However, they do not explicitly recognise the fact that specific external manifestations are actually the effects of specific fundamental causal factors. There is no comprehensive study in this area, which identifies the basic factors that determine certain characteristics of IT use in organisations. Individual studies have been conducted in an isolated manner. There is also no explicit conceptual understanding of the connection between the basic factors and specific external manifestations. Therefore the research in this field has not yet reached a state where it could yield a detailed and operational framework for determining and managing the level of organisational emphasis on IT resources. What has been missing is a contingency approach that can predict or prescribe the level of importance / relevance of IT for an organisation, in terms of well defined characteristics of IT deployment.

This study addresses a major deficiency in the current research focus in this field. It involves development of a framework for analysing the determinants of and hence explaining the differences in, the characteristics of IT deployment, across organisations. The framework presents a comprehensive scheme for identifying the fundamental factors that influence IT deployment and provides an explanation of how these factors affect the characteristics of IT deployment. The study is based on available literature in the fields of competitive strategy, information systems deployment, information processing activities of organisations and relevant aspects of organisation culture, and the findings of a detailed empirical survey of eighteen Indian organisations in various industry sectors. The dissertation also includes case studies of nine Indian organisations, to illustrate the various concepts developed in the framework.

The framework is primarily in the nature of general guidelines at a conceptual level, for analysing, explaining, anticipating and controlling changes in IT deployment in organisations over time. It can be appropriately classified as research belonging to the Theory Building type.

The framework aims at developing a comprehensive understanding of a basic phenomenon which is of great importance in the current context of technological turbulence and aggressive

marketing of IT, and yet which has not been adequately researched into, so far. It leads to a significantly improved understanding of the phenomenon of differences in the character of IT deployment across organisations, because of the following contributions.

1. **The framework presents a comprehensive enumeration and classification, of fundamental business and organisation related factors that influence the deployment of IT.** These causal factors have been classified in the form of three specific constructs, viz. *Information Intensity*, *Pressures to Perform* and *Internal IT Drive*. Each of these constructs represents a distinctive reason for IT deployment, and consists of multiple level groupings of conceptually related factors.

The above analysis has enabled the study to delineate eight theoretically possible *IT Deployment States*, depending on the values of the three constructs. These states describe the different combinations of reasons for IT deployment, and have been named in an appropriate manner.

2. **The framework identifies the characteristics of IT deployment, the decisions responsible for which are influenced by the combination of factors described in 1 above.** These characteristics have evolved in recognition of the findings of the empirical and literature surveys. They have been described in terms of two constructs.

The first construct, viz., *Planned Investment*, describes the scale of investment that organisations make in IT. The second construct, viz., *Planned Impact* describes the extent of strategic and operational impact of IT on the organisation.

The above analysis culminates into delineation of four theoretically possible distinct *IT Deployment Types*, depending on the values of the two constructs. These types describe the external manifestations of IT deployment in the organisation, and have been appropriately named.

3. **The framework also develops an explanation of how the basic factors identified and grouped in terms of the three constructs in 1 above, influence the characteristics of IT deployment identified in 2 above.** In the process, it maps the eight distinct *IT Deployment States* onto the four distinct *IT Deployment Types*.

Thus the framework facilitates an analysis of the determinants of and differences in, the character of IT deployment in organisations. The individual *IT Deployment States* and the constituent constructs help us to identify the factors that could drive the deployment of IT in a particular manner. The *IT Deployment Types* define the corresponding characteristics of IT deployment.

Further, the framework has significant predictive and prescriptive value. It prescribes three levels of appropriate strategies for managing the organisational IS/IT environments, based on the following levels of analysis.

1. The fundamental factors that influence IT deployment.
2. The higher level constructs that influence IT deployment, that is *Information Intensity*, *Pressures to Perform* and *Internal IT Drive*.
3. The characteristics of IT deployment, that is, *Planned Impact* and *Planned Investment*

These prescriptions have been given with a view to predicting and controlling the deployment and use of IT in organisations, and inducing and managing transitions from one state to another. They also ensure effective management of IS/IT in the new state, once the transition is complete.

The framework, as described above, has been demonstrated through nine detailed case studies presented at the end of this dissertation. In addition, the dissertation presents a detailed literature survey on conceptually related topics like competitive strategy, information processing in organisations and organisation culture. Each of these aspects of the survey has been structured to bring out the linkages between the individual concepts and also between the findings of the literature survey and the main theme of the dissertation, that is, the determinants of IT deployment in organisations. The extensive exploratory survey ensured that the framework conforms to empirical reality.

To conclude, this research is expected to substantially enhance our understanding of the vexing and as yet unexplained issues of why different organisations deploy IT in different ways, why the use of IT is more appropriate in some instances, than in others, and how the relevance of IT varies for different organisations. Such an understanding is of enormous significance in present times, given the rapidity with which new IT tools are emerging and given the uncertainty that organisations face in investing into and directing the use of their IT

resources. The study provides scope for hypothesis testing in further research and is also expected to be of use to practitioners as an operational tool.

Related Publications

Tarafdar M., and Vaidya S. D., “Research in Organizational Adoption of E-Commerce: The Need for an Interdisciplinary Perspective” in Janet deGross (ed.), *Proceedings of the Americas Conference on Information Systems*, Dallas, August 2002.

Tarafdar M., and Vaidya S. D., “Challenges in the Deployment of E-commerce Technologies: The Role of Organizational Factors” in Kaushal Chari and Kemal Altinkemer (eds.), *Proceedings of the Sixth INFORMS Conference on Information Systems and Technology*, Miami, November 2001.

Vaidya S.D., and Tarafdar M., (2000) “Deployment of Information Technology in Organizations: Present Perspectives and Directions for Future Research,” *Working Paper Series*, IIM Calcutta, IIM-/WPS/2000