

Efficacy of Existing IS Planning Models for E-Business

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Abstract

Information system planning is the process of identifying a portfolio of computer-based applications that will assist an organization in executing its business plans and realizing its business goals. There is no perfect IS planning process for each organization. Each organization ends up developing its own nature and model of IS planning, often by selecting a model and modifying it as it goes along in developing its own planning process. The IS planning models should provide a range of alternatives from which organizations might select an approach and begin to develop their own strategic IS planning process. This paper discusses the various IS planning models used by organizations and comments on their effectiveness. It also tries to comment on the gaps in view of the developments in information and communication technologies and consequent shifting of processes to organizations in the business network.

Introduction

Information System Planning

Information System (IS) planning has been defined as the process of identifying a portfolio of computer-based applications that will assist an organization in executing its business plans and realizing its business goals (Lederer & Sethi, 1996). IS planning involves the selection of a combination of applications from an existing list of possibilities that would best fit the organization's current and future needs. It might also entail the creation of new applications with the potential to create an advantage over competitors (McFarlan, 1984). IS planning is an important activity for helping information executives and top management identify strategic applications and align information technology with business needs. IS planning can contribute substantially to organization because it can help identify the most desirable IS applications in which to invest (Henderson & Sifonis, 1988). It can help an organization to execute its existing business strategies and can also help identify new business strategies, as well as technology policies and architectures for these strategies (Earl, 1993).

The failure to execute IS planning effectively can cause such problems as lost opportunities, duplicated

efforts, incompatible systems, and wasted resources. In fact, today's turbulent and competitive environment, with its rapidly changing information technology, has exacerbated the dangers of ineffective planning (Galliers, 1993). Hence, it is no surprise that IS planning is viewed as a key corporate issue (Niederman & Brancheau, 1991).

Need for Information System Planning

The last few years have seen a global sea change in the IT and telecom industry. There has been a significant growth in inter-enterprise applications, IT-enabled services (ITeS) and business process outsourcing (BPO). Businesses are investing huge sums of money in their IT applications. Gartner predicts that global IT services spending will surpass \$707 billion by 2007, recording a 5.7 percent compound annual growth rate (CAGR) (Gartner Summit India, 2003). It stated that the primary drivers for growth would include spending by governments, manufacturing, communications, and financial services. India is in the forefront of this IT driven growth. According to IDC, the total Indian IT market (domestic plus exports) witnessed a growth of 21 percent to reach \$16.2 billion¹ in 2002 (IDC report, July 2003). IDC sees a continued growth performance for the sector over the next four years and expects the

¹Conversion Rate Used: 1 US dollar (\$) = 45 Indian Rupees (Rs.)

IT market to grow by a CAGR of 27.9 percent to reach \$43.6 billion in 2006.

If business and information technology were stable rather than rapidly changing, and if large-scale information systems applications could be built swiftly at marginal cost and put together into accessible architectures, then IS planning would probably be unnecessary. However, because information technology is increasingly complex and expensive and business is fiercely competitive, planners need guidance for IS planning. Therefore, a study to understand the possible e-business strategies and bring out important criteria in IS planning for networks, especially in the Indian context, would be very timely and helpful. This research could be of immense use to companies that are planning or are already on the migration path toward an e-business enterprise.

Information System Planning for a Networked Enterprise

With such large scale investments in information systems and assuming fundamentally that the planning for networks should be different, it is important to examine the factors which make the planning environment in case of MNC's different. These factors include the increased role of information, reduced transaction and co-ordination costs, and the economics of a network and its effect.

Role of Information in Planning for a Networked Enterprise

Information is an agent of coordination and control in an e-business and serves as the glue that holds together organizations, franchises, supply chains, and distribution channels. Along with material and other resource flows, information flows must also be handled effectively in any organization. Organization structures, distribution channels, and supply chains are traditionally optimized to handle simultaneously both resource flows and information flows. For example, distribution outlets are designed for delivery of both product information and the physical product being sold. Economists contend that there are some fundamental ways in which information differs from other organizational resources, and those differences

form the basis of some of the emerging e-business models (Shapiro & Varian, 1999; Evans & Wurster, 1997). Evans and Wurster (1997) suggested that the deconstruction of old business models is fundamentally one of separating information flows from physical flows and organizing differently to handle each of these flows. Such separation is expected to release value that has hitherto been suppressed because of sub-optimal design of organizational systems.

Such valuation is in part because separation of the informational component of a business provides opportunities to turn information into a product or service. Information can be sold for profit or given away free (in lieu of some other benefit), and the economics of such business models is very attractive due to the unique characteristics of information products (Shapiro & Varian, 1999). The economics of e-business suggests that the information management needs of firms should be shaped by business needs to integrate processes, exchange information in a timely manner, and create positive network externalities.

The Internet also shrinks information asymmetry. In the past, companies had to trade off between the richness and reach of information. Internet connectivity and universal standards for information exchange radically lower the cost of providing rich, detailed information to large numbers of people, reducing the trade-off.

Reduced Transaction and Coordination Costs in a Network

Transaction cost theory explains the economics of information and information systems. The originator of this theory, Ronald Coase (1937), argued that, contrary to assumptions that transactions through exchange mechanisms are homogeneous, real-life transactions are more complex and involve transaction costs. Markets reduce transaction costs since people dealing through market mechanisms do not need to negotiate and enforce individual contracts, nor do they need to acquire and process information about alternatives. Generally, the less organized the market, the higher the transaction costs.

It is suggested that integration of organizational

and inter-organizational processes (including customer processes) significantly reduces transaction costs (Hoffman & Hsu, 1993). Integration with outside agents also results in increased risk to firms. Firms have tended to avoid such transaction risks either by becoming vertically integrated or by reducing coordination with external partners. However, information technology can lower coordination costs without increasing the associated transaction costs, leading to more outsourcing and less vertically integrated firms (Clemons et al., 1993). The potential to lower transaction costs by using information technology presents a significant strategic opportunity that organizations may exploit to succeed in the new economy.

IT can also reduce internal management costs. According to agency theory, the firm is viewed as a “nexus of contracts” among self-interested individuals rather than as a unified profit-maximizing entity (Jensen & Meckling, 1976). A principal (owner) employs “agents” (employees) to perform work on his or her behalf. However, agents need constant supervision and management, because they otherwise will tend to pursue their own interests rather than those of the owners. As firms grow in size and scope, agency costs or co-ordination costs rise because owners must expend more and more effort supervising and managing employees. IT helps to reduce agency costs (co-ordination costs) at firm level and at network level, and information systems are being re-modeled to achieve these objectives.

Network Economics

In traditional economics, production experiences diminishing returns: The more any given resource is applied to production, the lower the marginal gain in output until a point is reached where additional inputs produce no additional outputs. However, in a network, adding another participant entails no marginal costs but creates much larger marginal gain. The economic concept of network externalities or network effects explains how the value of a product or service increases as the number of users of the product or the service increases. Metcalf stated this law as “the usefulness, or utility, of a network equals the square of the number of users” (Downes & Mui, 1998). Thus, it

is reasonable to assume that the greater the number of people, machines, and networks that interact with one another through an e-business information system, the higher will be its value. In general, a higher value will be achieved by e-business systems that create global communities of customers, business partners, and suppliers.

Technologies subject to strong network effects tend to exhibit long lead times followed by explosive growth. The pattern results from positive feedback. “Significance precedes momentum” (Kelly, 1998). It points to the conclusion that growth up to a specific point along the trajectory can be quite slow, up to the tripping point region. Beyond the tripping point, the compounding effects push the developing enterprise beyond the point of runaway growth. Significance building involves critical activities such as finding partners, building strategic alliances, and establishing standards. Extrapolation of any performance measures such as ROI (Return on Investment) before reaching the tripping point may lead to unwise investment decision-making. The Internet exhibited the same pattern. The first e-mail message was sent in 1969. The Internet was slow to take off, but the subsequent growth has been phenomenal. Earlier IS planning models did not consider economies of network and its positive effect. The newer networks should recognize and leverage the benefits of network in realizing the returns.

Competing Business Networks

In a business network, a particular node can be a partner in the knowledge network at one moment, and at another moment it can be a competitor or a customer. Therefore, the business network may have a continuously changing, dynamic mix of partners. This coupling and decoupling of nodes reaches outside any particular legal organization. Competitive success, to a large extent, now depends on how well the entire business network delivers value to its ultimate customers, relative to its competing business networks (Christiansen & Kumar, 2000). Earlier, such issues did not arise due to the nature of the enterprise. The IS planning for a business network has to be done taking this dimension into consideration.

Study of Existing IS Planning Models and Identification of Gaps

A number of IS planning models have been suggested by various authors. These models can be broadly classified into impact and alignment models (Vitale et al., 1986).

Alignment Models

Alignment models focus on aligning the information system's plans and priorities with organizational strategy and business goals. Popular alignment methodologies include Critical Success Factors, Business Systems Planning from IBM, and strategic systems planning and information engineering (Martin, 1989).

Critical Success Factors (CSF) Model

The CSF model (Rockart, 1979) focuses on identifying critical information needs of senior executives and building information systems around those needs. The emphasis on senior management's information requirements is based on an organizational control model of critical decisions being made by informed executives. However, the control in e-business is more diffuse and autonomous, and often occurs outside the organization. This reduces the usefulness of this methodology for e-business architecture planning.

Business Systems Planning (BSP) Model

The BSP model combines top-down planning with bottom-up implementation and focuses on a firm's business processes to derive data needs and classes.

Strategic Systems Planning Model

The strategic systems planning model stresses functional area analysis to identify the data architecture, which is then used to design information systems.

Information Engineering Models

Information engineering models provide techniques for building enterprise, data, and process models. These models are combined to form a comprehensive knowledge base that is used to create and maintain information systems.

The experience of organizations suggests that these models tend to be too detailed, time-consuming, and expensive. The roots of these models can be traced to systems development practices of the 1980s. Since then new paradigms such as component-based development have come into use. These paradigms place less emphasis on building applications from scratch and stress a factory approach of assembling pre-packaged components to create application systems. Hence, organizations often find methodologies such as BSP too rigid and unsuitable for the highly-compressed development cycle times that prevail in e-business applications development.

Moreover, e-business planning requires addressing how diverse systems and platforms will be integrated to meet organizational requirements. The alignment methodologies fail to address explicitly such integration issues because they come from an era when organizations created their own information systems, and cross-platform integration was not a primary need. These shortcomings owe in part to the significant shifts in business practices and technological capabilities in the last few years. In addition, some of the planning models do not have strong theoretical roots, which makes it difficult to augment them to suit new contexts.

Impact Models

Impact models focus on the potential impact of information technology on organizational tasks and processes, and use this focus as the basis to identify opportunities for deploying information systems (Flynn & Arce, 1995). Broadly, there are two models: value chain analysis and the competitive forces model.

Value Chain Analysis

Michael Porter's value chain analysis is by far the most widely-used impact model. According to Porter, "every firm is a collection of activities that are performed to design, produce, market, deliver, and support its product." These activities can be represented using a value chain (Porter, 1980). Value chain analysis helps in identifying important value-adding processes that

could be made more effective using information technology. As a planning methodology, value chain analysis is too abstract, because it does not provide specific guidelines for designing an information architecture, nor does it provide guidelines for systems development and implementation (Porter & Millar, 1985). Moreover, over the past year, there has been a strategic shift from thinking about value chains to value hubs, where the "linear" value chain perspective has evolved to a "hub-centric" model, that is, e-marketplaces. A value web or hub is a customer-driven network of independent firms. It uses IT to co-ordinate diverse value chains for collectively producing a product or service. This shift in thinking has been largely driven by two factors: the competitive pressures to respond to a direct selling strategy initiated by companies like Dell, and the maturation of the Internet and related technologies. These changes limit the applicability of the original value chain model for information systems planning for e-business.

The key driving forces in a network environment are different. For example, the concept of "value" and "value creation" assumes different significance in a network context. In a network, multiple stakeholders demand multiple competitive value offerings. This process may involve re-configuration of the existing value chain to enable delivery of enhanced value offerings to multiple stakeholders. Here, a value plane perspective may better describe the distributed generation of value across multiple network stakeholders than the traditional one-dimensional value chain (Tovstiga & Fantner, 2000). The new value construct approximates a three-dimensional space of new business opportunity featuring a value plane and a technological innovation axis.

Competitive Forces Model

The competitive forces model (Porter, 1980), rests on the assumption that a firm faces a number of external threats and opportunities, such as the threat of new entrants, the pressure from substitute products or services, and the positioning of traditional indus-

try competitors. According to this model, the competitive advantage can be achieved by enhancing the firm's ability to deal with customers, suppliers, substitute products and services, and new entrants to its market, which in turn may change the balance of power between a firm and other competitors in the industry in the firm's favor. In this model, IS planning may be done so that information systems can be used as an enabler to achieve strategic advantage for a firm.

The traditional competitive forces model may not be applicable in cases of competing business networks. The traditional Porter model assumes a relatively static industry environment, relatively clear-cut industry boundaries, and a relatively stable set of suppliers, substitutes, and customers. Instead of participating in a single industry, today's firms participate in "industry sets" or business networks. Therefore, the competitive forces model should address intra-industry competition and also consider the impact of the Internet in analyzing strategy. In the Internet age, traditional competitive forces are still at work and competitive rivalry has become much more intense. The focus has shifted to partner orientation in a network to meet competition.

Future Directions

Existing models and frameworks all have their own specific aims (Min & Galle, 1999). As Pant and Hsu (1999) contended, owing to the complexity of the IS strategic planning process and uniqueness of individual organizations, no best method of tackling the IS planning problems exists.

Most of the above frameworks help business strategic planners to understand how to plan IS applications rapidly at the organization level, but organizations need to consider planning for Internet and Web-based information systems. The framework used for IS planning should also consider managerial and organizational problems, changing management issues in defining how planning should be done, and how best to exploit current methodologies.

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