An Empirical Analysis of Conventional Model of Information Technology Infrastructure in Business Process Re-engineering

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Abstract: This research paper examines the conventional model of information technology infrastructure in business process reengineering and it also explores the capabilities of IT in every phase of the business organization and its co-related factors. This research model intended to organizations factors, IT infrastructure capabilities and external and internal organization's variable (organizational size, information intensity, perceived role of IT, IT business, IT business alignment, and business synergy). The characteristics of an organization's external environment are not directly related to an organization's information technology infrastructure capabilities but it plays an important role for effectiveness of business organization.

Keywords- BPR, IT, SAP, JD, GIS, ERP

I. INTRODUCTION

Information technology (IT) has historically played an important role in the reengineering concept.[9] It is considered by some as a major enabler for new forms of working and collaborating within an organization and across organizational borders[citation needed].

Early BPR literature [10] identified several so called disruptive technologies that were supposed to challenge traditional wisdom about how work should be performed.

a. *Shared databases,* making information available at many places
b. *Expert systems,* allowing generalists to perform specialist tasks
c. *Telecommunication networks,* allowing organizations to be centralized and decentralized at the same time
d. *Decision-support tools,* allowing decision-making to be a part of everybody's job
e. *Wireless data communication and portable computers,* allowing field personnel to work office independent
f. *Interactive videodisk,* to get in immediate contact with potential buyers
g. *Automatic identification* and tracking, allowing things to tell where they are, instead of requiring to be found
h. *High performance computing,* allowing on-the-fly planning and re-visioning.

In the mid 1990s, especially workflow management systems were considered as a significant contributor to improved process efficiency. Also ERP (Enterprise Resource Planning) vendors, such as SAP, JD Edwards, Oracle, PeopleSoft, positioned their solutions as vehicles for business process redesign and improvement.

Business-IT alignment is a dynamic state in which a business organization is able to use information technology (IT) effectively to achieve business objectives - typically improved financial performance or marketplace competitiveness. Some definitions focus more on outcomes (the ability of IT to produce business value) than means (the harmony between IT and business decision-makers within the organizations); for example, Alignment is the capacity to demonstrate a positive relationship between information technologies and the accepted financial measures of performance. [1]

This alignment is in contrast to what is often experienced in organizations: IT and business professionals unable to bridge the gap between themselves because of differences in objectives, culture, and incentives and a mutual ignorance for the other group's body of knowledge. This rift generally results in expensive IT systems that do not provide adequate return on investment. For this reason, the search for Business / IT Alignment is closely associated with attempts to improve the business value of IT investments.

It is not unusual for business and IT professionals within an organization to experience conflict and in-fighting as lack of mutual understanding and the failure to produce desired results leads to blaming and mistrust.

II. CAPABILITIES OF INFORMATION TECHNOLOGY IN BUSINESS PROCESS REENGINEERING

a. *Transactional:* Information technology can transfer unstructured business process into standardized transactions.
b. *Geographical:* Information technology can transfer with rapidity and case across large distance, making business process independent of locations.
c. *Automation:* Information technology can reduces human labor in certain process.

d. **Informational:** Information technology can bring vast volume of detailed information into a business process.

e. **Analytical:** Information technology can bring complex analytical methods to bear on a process.

f. **Sequential:** Information technology enables changes in the sequence of task in a process, often allows multiple task to be work on simultaneously.

g. **Knowledge Management:** Information technology allows the capture and dissemination of knowledge and expertise to improve the process.

h. **Tracking:** Information technology allows detailed tracking of status, inputs and outputs.

i. **Reduction of Inter diaries:** Information technology can be used to connect two parties within a process that would otherwise communicate through inter diaries.

III. RELATED APPROACH

Marianne Broadbent, Peter Weill and Don St. Clair (Jun., 1999), analyzed the business process redesign (BPR) is a pervasive but challenging tool for transforming organizations. Information technology plays an important role by either enabling or constraining successful BPR. This paper explores the links between firm-wide IT infrastructure and business process change. IT infrastructure is the base foundation of the IT portfolio, which is shared throughout the firm in the form of reliable services, and is usually coordinated by the IS group. IT infrastructure capability includes both the technical and managerial expertise required to provide reliable physical services and extensive electronic connectivity within and outside the firm. Exploratory case analysis of four firms (two in retail and two in petroleum) was used to understand the ways IT infrastructure contributes to success in implementing BPR. The finding was that all firms needed a basic level of IT infrastructure capability to implement BPR.

The firms that had developed a higher level of IT infrastructure capabilities, before or concurrent with undertaking business process redesign, were able to implement extensive changes to their business processes over relatively short time frames. The higher level of infrastructure capability was provided in the form of (1) a set of infrastructure services that spanned organizational boundaries such as those between functions, business units, or firms, and (2) the ability of the infrastructure to reach particular constituencies inside and outside the firm to transfer information and process complex transactions. The more extensive business process changes were more innovative and radical, crossing business and functional unit boundaries, and resulted in more significant business impact. The practical implication of the study is that before embarking on any form of BPR, managers should complete a business audit of their IT infrastructure capabilities, as these capabilities have an important impact on the speed and nature of business process change [2].

Ganesh D. Bhatt, (2000) the research point out the business process redesign (BPR) is a management technique to radically transform organizations for dramatic improvement. Information technology (IT) plays a critical role in BPR. The present study examines the links between IT infrastructure and BPR. The moderating effects of industry type, and information intensity of the firm are also analyzed. Data for the study were gathered through a survey of Fortune 500 US firms at divisional levels. Out of 1,200 questionnaires mailed to Fortune500 firm-divisions, 124 responses were received. Out of 124 firm-divisions 73 firm-divisions were found to be adopting BPR techniques; 39 firm-divisions were found to be adopting incremental improvement approaches. The rest of the responses were incomplete and could not be used. For data analysis, therefore, only 73 firm-divisions were considered. The results of the study support the hypotheses that network infrastructure affects the dimensions of BPR (process improvement thrust, and customer focus), but data integration was not found to be significantly affecting the BPR dimensions. The moderating effect of industry type was found to be significantly affecting the relationship between network infrastructure and BPR dimensions. Other relationships were not found to be significant. [3]

Infrastructure is how companies organize the people side of their business. It establishes roles, responsibilities, authority, focus, and control within the organization. It determines how innovative, creative, response or bureaucratic an organization will be. It defines how things get done in the organization and establishes the boundary of acceptable behaviors. It determines how well people work, and how well they work together. It is what takes a collection of individuals and turns them into IBM, GM or 3M [4].

The researcher analyzed the empirical study on the role of IT in process improvement in a multidimensional way. The purpose of this paper is to investigate the extent that IT could be used (from low tech to high tech and constraint to proactive), type of process reengineering projects employed (compromise to radical) and their effect on firm performance. The firm performance was defined as market share, customer relationships Management, IT impact, and efficiency (as multifaceted such as lowering the cost, lowering the process variability, and lead time) [5].

The researcher examines a series of relationships between information technology (IT) and business process reengineering (BPR).Specifically; it argues that those aspiring to do business process reengineering must begin to apply the capabilities of information technology. This paper provides a summary of IT roles in initiating and sustaining BPR and examines several companies that have successfully applied IT to reengineering. The paper also addressees barriers to successful implementation of reengineering and identifies critical factors for its success [6].

The researcher analyzed the use of information technology (IT) to change the way of doing business and structuring organization. Impact of new technologies on the infra-structure of doing business; Concept of BPR; Role of IT in BPR; Information architecture and information systems; Top-down approach; Methodologies for developing information engineering[7].

Grover Varun, Fiedler, Kirk D, Teng, James T. C empirically examines the importance of facets of the organizational structure, IT knowledge resources and infrastructure, and the IS function in the initiation of BPR. Data from 313 corporations were gathered using a carefully

validated survey, and initiators were compared with no initiators. The results strongly suggest that client-server architectures, the strategic integration of IS, and cross departmental interaction are among the more important factors facilitating initiation and can be important inputs in a BPR decision-making process. The study attempts to build a contingent theory for BPR, and the more sustainable notion of fundamental process change [8].

Innocent Baguma (Oct, 2008) has promoted business process reengineering as an essential element in helping organizations to achieve their goals. The literature has further claimed that Information Technology (IT) is a major enabler of business process reengineering. Despite all these claims, there has been hardly any effort to demonstrate the interrelationship between business process and information technology infrastructure, and which modeling technique can be used to demonstrate the relationship. This paper investigates how simulation modeling can demonstrate the impact of IT infrastructure on business process. The dynamic synthesis methodology is used with data collected from five commercial banks. The same collected data is used to validate the model. The results indicate that network infrastructure and data integration were significantly related to the process improvement thrust, such that network infrastructure is critical in improving business processes and enhancing customer service [9].

Spencer Rugaber, Linda M. Wills (1996) analyzed the software reengineering is growing rapidly in response to the critical need that exists in the software industry for technology to support legacy system maintenance and evolutionary development of new systems. As the field matures, it is essential to achieve coherence across the many research efforts that are underway to develop technology to support reengineering. In particular, for reengineering research to have an impact on actual reengineering practice, we need to achieve a consensus on the fundamental goals and products of reengineering research and how they relate to practitioners' needs, how to assess value and evaluate progress in the field, and how to facilitate communication among researchers and, more importantly, between researchers and practitioners. This paper proposes an infrastructure for drawing together work in the field, to coordinate and leverage our efforts and to encourage measurable progress [10].

Peter O'Neill, Amrik S. Sohal (March, 1999) demystify the confusion on Business Process Reengineering (BPR). This is achieved through a review of the literature covering the period from the late 1980s to 1998. Articles published in the leading business journals and the more popular business magazines were included in the review, as well as books published on the topic. The paper first discusses the need for reengineering and then reviews the literature under the following headings: definition of BPR, BPR tools and techniques, BPR and TQM co-existence, understanding organizational processes, the reengineering challenge, and organizational redesign using BPR. The review shows that considerable confusion exists as to exactly what constitutes BPR. Authors place different emphasis on the definition of BPR and the many outcomes possible with BPR [11].

Rugaber, (1997) build a research infrastructure for the area of reengineering. The main idea is to better share and build upon each other's results. The article presents some steps that the software community can take to address these issues and to leverage their efforts. Some of these are already underway, some are understood but need to be implemented, and some are themselves research questions that need to be examined. All of them need contributions from volunteer participants. These steps include increased interaction with industry, the development of a repository of research artifacts, and convergence of intermediate representations [12].

T Al-Mashari, M. and Zairi, M. (2000) analyzed the framework is based on the examination of BPR principles, the role of IT in BPR and the benefits of IT-enabled BPR. The authors presented various IT infrastructural considerations in BPR implementation and consolidated them into a number of elements found to be critical to successful outcomes of this process. Full benefits resulting from the introduction of enabling IT infrastructures for BPR initiatives will not be gained unless a fully integrated and balanced perspective is taken toward linking together all essential IT infrastructure management elements [13].

Bergeron, F., Raymond, L. and Rivard, S. (2004) , nonfactual co-alignment patterns of business strategy, business structure, IT strategy, and IT structure will exhibit lower levels of business performance. However, using the fit between business dimensions and IT dimensions to explain performance is valid only if organizations have minimum thresholds on all four alignment domains, that is, are not systematically at the low end of the spectrum. Low-performance firms reveal a nonfactual co-alignment pattern of business strategy, business structure, IT strategy and IT structure that distinguish them from other, higher performing firms. In order to achieve systems integration and increase performance when organizations face shifts in the business environment, managers must link changes in strategic choices across all four of the domains in a systematic way [14].

IV. PROPOSED WORK

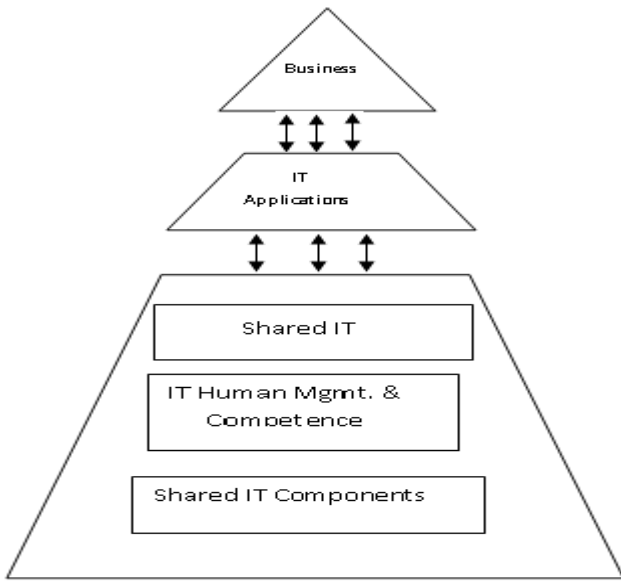a. *Conventional Model Of Information Technology Infrastructure:*

Figure 1: Key Components of IT infrastructure (Adapted from McKay and Brockway, 1989)

The conventional model of information technology infrastructure was adapted by Adapted from McKay and Brockway, 1989) to explores the capabilities of information technology in every processes of the organizational development. This model has a separate wing of IT department to solve the individual of the organizational activities. There is no direct correlation between IT department to external and internal factors of the organization. The organizational factors, IT-business alignment, the perceived role of IT, and business synergy are the most significant predictors of an organization's IT infrastructure capabilities.

b. Limitation:

a) No Significant effects of external environment on IT infrastructure capabilities.
b) No direct co-relation between internal and external factors of organization.
c) It is restricted to small to medium size organization.

c. Information Technology Infrastructure Capabilities: Organizational Development:
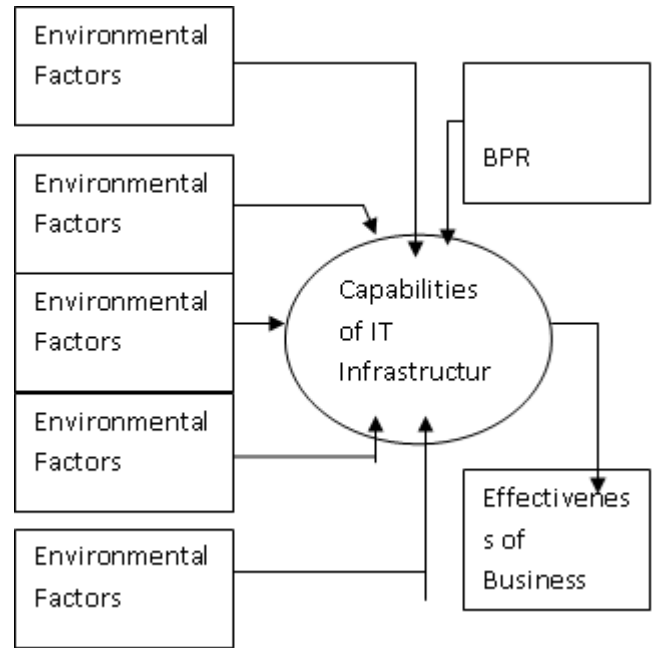

Figure 2: Information Technology Infrastructure Capabilities in Organizational Development

The researchers are stated that IT infrastructure reassessment and composition as a vital factor in successful BPR implementation (Al-Mashari & Zairi, 1999). Hammer (1990) prescribes the use of IT to challenge the assumptions inherent in the work process that have existed since long before the advent of modern computer and communications technology (Malhotra, 1998). Factors related to IT infrastructure have been increasingly considered by many researchers and practitioners as a vital component of successful BPR efforts (Ross, 1998). Effective alignment of IT infrastructure and BPR strategy, building an effective IT infrastructure, adequate IT infrastructure investment decision, adequate measurement of IT infrastructure effectiveness, proper information systems (IS) integration, effective reengineering of legacy IS, increasing IT function competency, and effective use of software tools are the most important factors that contribute to the success of BPR projects. These are vital factors that contribute to building an effective IT infrastructure for business processes (Al-Mashari & Zairi, 1999).

An IT infrastructure is made up of physical assets, intellectual assets, shared services (Broadbent & Weill, 1997), and their linkages (Kayworth, et al., 1997). The way in which the IT infrastructure components are composed and their linkages determines the extent to which information resources can be delivered. An effective IT infrastructure composition process follows a top-down approach, beginning with business strategy and IS strategy and passing through designs of data, systems, and computer architecture (Malhotra, 1996). Linkages between the IT infrastructure components, as well as descriptions of their contexts of interaction, are important for ensuring integrity and consistency among the IT infrastructure components (Ross, 1998). Furthermore, IT standards have a major role in reconciling various infrastructure components to provide shared IT services that are of a certain degree of

effectiveness to support business process applications, as well as to guide the process of acquiring, managing, and utilizing IT assets (Kayworth, et al., 1997). The IT infrastructure shared services and the human IT infrastructure components, in terms of their responsibilities and their needed expertise, are both vital to the process of the IT infrastructure composition. IT strategic alignment is approached through the process of integration between business and IT strategies, as well as between IT and organizational infrastructures (Al-Mashari & Zairi, 1999).

V. CONCLUSION

This study is based on existing research paper and journal to examine the organization determinants and impact of information technology infrastructure. The research focuses on conventional model of information technology infrastructure capabilities which are positively related to perceived role of IT, the role of IT alignment, and business synergy, but are negatively related to level of an organization's information intensity. The study can be used to future exploration of organization determinants of IT infrastructure capabilities requirements.

VI. REFERENCES

[1].   Paul A. Strassmann (August, 1998)'Alignment is The Delivery of the Required Results', Published in Cutter IT Journal, August 1998

[2].   Marianne Broadbent, Peter Weill and Don St. Clair (Jun., 1999),'The Implications of Information Technology Infrastructure for   Business Process Redesign ', MIS Quarterly, Vol. 23, No. 2 (Jun., 1999), pp. 159-182

[3].   Ganesh D. Bhatt, (2000) "Exploring the relationship between information technology, infrastructure and business process re-engineering", Business Process Management Journal, Vol. 6 Iss: 2, pp.139 - 163

[4].   Organizational Infrastructure ©2010 DS Performance Group

[5].   Lotfollah najjar, Ziaul huq, Seyed-mahmoud aghazadeh, Saeedreza hafeznezam (Jan,2012), "Impact of IT on Process Improvement ",Journal of Emerging Trends in Computing and Information Sciences , VOL. 3, NO. 1 January 2012 ISSN 2079- 8407.

[6].   Mohsen Attaran," Exploring the relationship between information technology and business process reengineering ",Information & Management 41 (2004) 585– 596, # 2003 Published by Elsevier B.V. doi:10.1016/S0378-7206 (03) 00098-3.

[7].   Kim, Bonn-Oh,' Business process reengineering: Building cross-functional information architecture.' ,Journal of Systems Management; Dec94, Vol. 45 Issue 12, p30, 6p, ISSN: 00224839

[8].   Grover, Varun,Fiedler, Kirk D ,Teng, James T. C,   'The Role of Organizational and Information Technology Antecedents in Reengineering Initiation Behavior. ', Source: Decision Sciences;   Summer99, Vol. 30 Issue 3, p749-781, 33p ISSN: 00117315.

[9].   Innocent Baguma (Oct,2008), 'A Simulation Modeling-Based Investigation of the Impact of IT Infrastructure on Business Process Reengineering ',International Journal of Computing and ICT Research, ISSN 1818-1139 (Print), ISSN 1996-1065 (Online), Special Issue Vol.1, No.1 pp. 8, October 2008.

[10]. Spencer Rugaber, Linda M. Wills,' Creating a Research Infrastructure for Reengineering ',WCRE '96 Proceedings of the 3rd Working Conference on Reverse Engineering (WCRE '96) Page 98 IEEE Computer Society Washington, DC, USA ©1996 table of contents ISBN:0-8186-7674-4

[11]. Peter O'Neill, Amrik S. Sohal,' Business Process Reengineering A review of recent literature ',Technovation 19 (1999) 571–581 Received 2 January 1999; accepted 13 March 1999

[12]. Rugaber, S, Program Comprehension, 1997, IWPC '97,' Proceedings, Fifth International Workshop', on 28-30 Mar 1997 ISBN: 0-8186-7993-X

[13]. Al-Mashari, M. and Zairi, M. (2000). Creating a Fit Between BPR and IT Infrastructure: A Proposed Framework for Effective Implementation, International Journal of Flexible Manufacturing Systems 12(4): 253–274.

[14]. Bergeron, F., Raymond, L. and Rivard, S. (2004). Ideal Patterns of Strategic Alignment and Business Performance, Information & Management 41(8): 1003 – 1020.

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